Forestry

JAN 7 3 1930

VETERINARY MEDICINE

November, 1929

Contents

Rupture of the Diaphragm in a Cat.....450
Bovine Infectious Abortion.....453
Prevention and Control of Abortion.....457
The Control of Bang's Disease.....460
Sterility in Cattle 463
Diagnosis of Pregnancy in the Cow.....466
Calf Scours and Calf Pneumonia.....469
Anesthesia and Restraint of the Ox.....472
Bovine Dystocia 474
Operations on the foot in Cattle.....477
Snuffles in Rabbits 478
Surgery of the Eye in Cattle.....479
Teat Obstructions and Hard Milkers.....482
A Stubborn Case of Impaction.....483
Ablation of the Udder in Cattle.....484
Spread of Undulant Fever.....485
Traumatic Gastritis of Cattle.....486
Actinomycosis of Cattle.....489
Pyelonephritis of Cattle 491
Ano-vulvitis in Cattle 493
Ringworm in Cattle 494

No. 11
VOL. XXIV

180 N. Michigan Ave.
Chicago, U. S. A.

An open letter to our friends the Veterinarians

QUALITY · RELIABILITY · SERVICE

In many years of use by the Veterinary Profession, Fort Dodge biologics and pharmaceutics have gained an international reputation. They have earned this position by their never-failing purity, potency and uniform freshness.

If you have never used any Fort Dodge products, we urge you to try them on this basis of guarantee:

Every product bearing the Fort Dodge seal must please you and prove satisfactory in every respect. If not, your money will be cheerfully refunded and "no questions asked."

There is a Fort Dodge office year you

FORT DODGE

SERUM COMPANY

Veterinary Biologics and Pharmaceutics — U. S. Veterinary License No. 112

FORT DODGE, IOWA

Nationwide service to the Profession

Veterinary Medicine

VOL. XXIV NOVEMBER, 1929 No. 11

Published Monthly by the Veterinary Magazine Corporation
180 N. Michigan Ave., Chicago, Ill., U. S. A.
$4.00 a Year

Entered as second-class matter November 8, 1920, at the post office at Chicago, Illinois, under the Act of March 3, 1879.

Entered as second-class matter under the title of American Journal of Veterinary Medicine, July 19, 1910, at Chicago, Illinois, under Act of March 3, 1879.

Copyrighted 1928, by Veterinary Magazine Corporation.
All matter appearing in this publication is covered by copyright, and no part of it may be reproduced without permission. Permission will be granted on request for the reproduction of anything in the columns of VETERINARY MEDICINE if the purpose of the reproduction is unobjectionable. Where there is any doubt as to the propriety of reproduction, the wishes of the author will be consulted.

D. M. Campbell, Editor A. T. Kinsley, Associate Editor

One of the principal contributing factors to losses of livestock from poisonous plants is over crowding the pastures or ranges. By proper grazing, methods, rotation, etc., the losses incident to poisonous plants will be materially reduced.

The use of crude oil for the treatment of mange was known in the thirteenth century. Thus Marco Polo wrote of oil that was found in Asia Minor: "It is not good for food but is good to burn and to annoint camels with mange."

Cardaissin is the name of a new cardiac accelerator extracted from the supra-renal gland. With the exception of acceleration of heart rate, Cardaissin effects are the opposite of those observed for adrenalin. *Bio. Abstracts.*

M. E. Armstrong, M. R. C. V. S., has recently reported the use of naphthalene dissolved in olive oil and turpentine for the treatment of Johne's disease. Some fifteen cases of the disease received this treatment with results that to say the least, are encouraging. The dosage used was naphthalene one dram, olive oil one and one-half ounces, turpentine one-half ounce. This dosage is recommended daily until 14 doses have been given and repeated after an interval of one week. This treatment may be worthy of a trial.

According to Nighbert, kidney worms, *Stephanurus dentatus* may pass from their usual location in the peri-renal tissue in the hog through fistulous tracts into the urinary tracts and be eliminated from the host in the urine.

According to Drabble of Australia, parasites or other agencies capable of producing chronic irritation or inflammation in animal tissues are potential factors in cause of malignant tumors in animals. *Exp. Sta. Rec.* Vol. 60, No. 9.

Antimony potassium tartrate has been successfully used in the control of trypanosomiasis *Trypanosoma congolense* in cattle in Uganda. The dosage is 15 grains in 25cc of distilled water injected intravenously for four consecutive days. *Trop. Vet. Bul.* -17-1.

Medicine is the first profession in the world to formulate and adopt principles of ethics as a guide to rules of conduct. These principles have withstood the vicissitudes of a changing world for thousands of years. They are as sound in principle today as they were in the beginning, and they have been a constant and ever-present inspiration to the profession.—Malcolm L. Harris, President, A. M. A.

DIAPHRAMATIC HERNIA IN A CAT WITH DISPLACEMENT OF ABDOMINAL VISCERA

Subject: A half-breed Persian male cat, three years old, and in good flesh.

History: This cat was injured when five months old by a swinging door. After a prolonged illness the cat recovered; except that its breathing was thereafter more labored. Moreover, the animal showed marked symptoms of pain when lifted up by its front feet. The difficult breathing was noticeably increased in hot weather. When first seen by the writer, the cat appeared to be affected with mange and the owner was advised to take the cat to the hospital for examination and treatment. Unfortunately the cat died before reaching the hospital, due evidently to the excitement and exertions incident to its removal.

Autopsy showed a large hernia, 4x3c.m. in the left side of the diaphragm. On removal of the sternum it was found that the small intestine, two lobes of the liver, and the spleen had passed through the rupture into the thoracic cavity. Coils of the small intestines extended into the anterior apex of the thorax, and were occupying the usual position of the heart. The heart had been displaced 15c.m. posterior to the normal location, and lay in contact with the right wall of the thorax. The left side of the thoracic cavity was considerably larger than the right, and the left lobes of the lung had atrophied greatly from pressure; moreover only a small portion of the cardiac lobe was functioning. The right lobes of the lungs were somewhat distorted from pressure, but carried on a reduced function.

According to the history, these abnormalities were the result of the injuries which occurred two years and seven months prior to the death of the cat. It is likely that the large size of the hernia prevented strangulation of the displaced organs, and that the organs adjusted themselves to their abnormal environment without fatal results to the animal, even though the breathing capacity had been greatly reduced.

Rupture of the diaphragm in various animals has been reported from time to

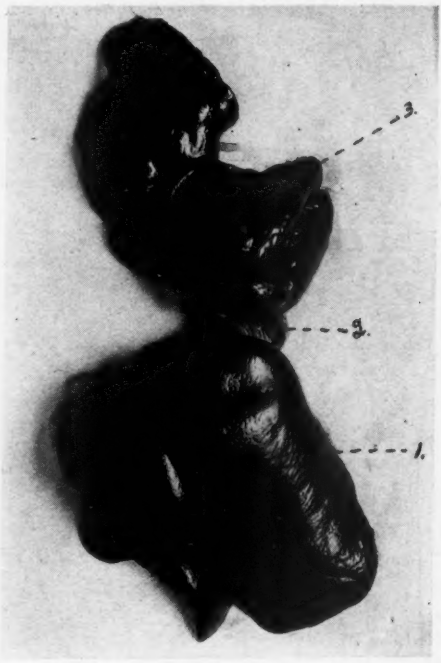


Fig. I.
Photo of the liver showing effect of rupture. 1. Normal part. 2. Point of rupture. 3. Part of liver that passed through rupture.

time but this case seems of particular interest in that the permanent displacements of a considerable portion of the abdominal viscera into the thoracic cavity had apparently not affected the normal functioning of these organs; at least to an extent to prevent the cat from developing into a normal size animal. The accompanying illustrations show the position of the various misplaced organs.

Columbia, Missouri. A. J. Durant,
Veterinary Department,
University of Missouri.

Fig. II.

Photo showing position of the various organs. 1. Heart posterior and against the right thoracic wall. 2. Lobe of liver extending forward past the heart. 3. Spleen anterior to the diaphragm. 4. Point of hernia. 5. Stomach. 6. Kidneys. 7. Bladder. 8. Rectum—only portion of intestines posterior to rupture of diaphragm. 9. Portion of liver in normal position posterior to diaphragm. 10. Cut surface of the right side of diaphragm. 11. Another lobe of the liver anterior to diaphragm, see Fig. 3. 12. Portion of distorted right lung.

Fig. III.

Photo showing organs after the intestines have been withdrawn and laid to one side in order to show position of hernia or rupture of the left side of the diaphragm. The heart and that portion of the liver within the thoracic cavity have been moved to the left by the removal of the intestines. 1. Heart. 2. Right lung. 3. Cut surface of right side of diaphragm. 4. Liver. 5. Rectum. 6. Bladder. 7. Kidneys. 8. Hernia showing small portion of diaphragm over which the intestines passed into thoracic cavity. 9. Liver. 10. Coils of intestines.

The Bacteriology and Epizoology of Bovine Infectious Abortion

By J. TRAUM, Berkeley, California
Division of Veterinary Science, Agricultural Experiment Station,
University of California

IT IS rather universally accepted that infection is responsible for the inflammatory changes in the maternal and fetal placentae which frequently but not always interfere with the proper development of the fetus and causes its premature expulsion. This view is held in spite of the reports[1, 2] of sporadic cases of abortion in which no bacterial or other virus could be demonstrated. Other agents, nevertheless, have been and are being held responsible for the production of abortion in cattle. Principal among these are mechanical injury, consumption of certain plants, moldy, ergotized or otherwise spoiled foodstuffs. The lack of vitamins and the failure to maintain the proper mineral balance, especially in high producing cows, have also been suggested as contributing causes to abortion and other reproductive disturbances. Definite experimental data[1, 3, 4] on these points are beginning to appear in literature, but thus far the importance of poor food as a factor in abortion has not been established.

Viruses in Infectious Abortion

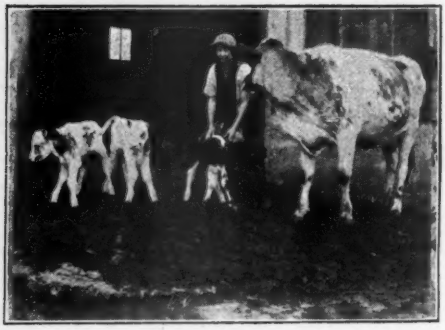
Of the micro-organismal agents associated with disease of the uterus, placenta, and fetus, a variety of bacteria have at one time or other been mentioned, but it has been rather definitely proved that *Brucella abortus* is of greatest importance in this connection in that by its multiplication and activities it produces the necessary changes to bring about abortion, and it has been found many times more than other organisms mentioned in this disease. At present the term *infectious abortion* refers to the disease induced by *Brucella abortus*.

There is, however, a noteworthy percentage of abortions in which the presence of *Brucella abortus* has not been established. In some of these no micro-organisms were demonstrated. In a small percentage of cases negative to *Brucella abortus* the *Vibrio fetus* has been found. This organism was first incriminated as the cause of abortion in sheep and in cattle in the British Isles by McFadyean and Stockman.[5] In this country, Theobald Smith[6] first directed attention to the relation of Vibrios to abortion in cattle and it has since been reported by others in the United States and other parts of the world.[7, 8] However, the number of cattle so affected is rather small compared with the infections caused by *Brucella abortus*. In this connection, the *Corynebacterium pyogenes* has also been mentioned,[9, 10] but its relation to abortion is not so well established as that of the *Vibrio fetus*.

Streptococci have been prominently mentioned by workers in New York State[11] as probably causing abortion. Recently also abortion diseases due to mycotic viruses has been reported. Smith[11] found a mucor so associated. Birch and Gilman[12] found three cases in one herd in which they isolated a

1. Traum, J. and G. H. Hart, California Exp. Sta. Bullet. 353, 1923, 327-346.
2. Traum, J. and G. H. Hart, *Journ. A. V. M. A.* N.S.20, 372-375.
3. Haring, C. M., Rept., California Exp. Sta. 1914-1915, p. 34.
4. *Hoard's Dairyman*, July 25, 1929.
5. McFadyean, J., and S. Stockman: Rep. of Dept. Com. app. by Board of Agr. and Fish. to inq. into Epiz. Abor. App. to Part iii (1913), p. 22.
6. Smith, Theobald: *Jour. Exp. Med.*, xxviii, no. 6 (1918), p. 701.
7. Barger, E. H.: *Jour. A. V. M. A.* 1928, Bd. 72 (25), S. 468.
8. Lerche, M.: Spirillen als Ursache des. ansteckenden Verkalbens. D. Tierarztl. W. 1922, S. 281.
9. Traum, J.: Calif. Agr. Exp. Sta. Bul. 353, 1923, p. 294-325.
10. Wall: Tenth International Vet. Congress, London, 1914.
11. Carpenter, C. M.: Rep. N. Y. State Vet. College, 1920-1921, p. 67.
12. Smith, Th., *Journ. Exp. Med.* 1920, 31, 115-122.
13. Birch, R. R., and H. L. Gilman: *Cornell Vet.*, 1925, 15, p. 81.

mucor from the fetuses and afterbirths. Fitch, Boyd and Delez[14] also report mycotic abortion. Bendixen and Plum[15] have reported both *Aspergillus fumagatus* and a mucor *(Absidia ramosa)* as causing abortion in cattle. Plum[16] found mammalian and avian tubercle bacilli responsible for changes capable of inducing abortion. The avian bacillus in Danish cases showed a predilection for the pregnant uterus. In America, however, the latter variety of tubercle bacilli has not as yet been proved to be the cause of abortion in cattle. The alterations induced by Vibrios and those due to avian tubercle bacilli resemble markedly those resulting from *Brucella abortus*.



Bull Triplets, delivered by Dr. R. L. Brown, Janesville, Wis.

Triplets delivered by Dr. C. D. Hornbeck, Deep River, Iowa.

14. Fitch, C. P., W. L. Boyd and A. L. Delez: *Jour. A. V. M. A.*, 1929, 75, (N.S.28) p. 224.

15. Bendixen, H. C., and N. Plum: Acta. Path. et Microb. Scandinav. 1929, 6, 253-322.

16. Plum, N.: *Cornell Vet.*, 1926, xvi, 237-249.

17. Bang, B.: *Zeitschrift für Tiermedicin*, i, no. 4, p. 241-278. Jena, 1897.

18. Meyer, K. F., and E. B. Shaw: *Jour. Inf. Dis.* 1920, Bd. 27, S. 173.

Brucella Abortus Infection

Although considerable work had been done to isolate the incitant of infectious abortion, it was not until 1897 that B. Bang[17] assisted by Stribolt succeeded in isolating and proving that a short non-motile gram negative rod was the cause of disease of the placentae and fetus and responsible for infectious abortion. This organism has variously been known as *Bangs bacillus, Bacillus abortus, Bacterium abortum, Alkaligenes abortus,* but is now definitely placed, at the suggestion of Meyer and Shaw,[18] in a new genus, *Brucella,* and the organism is generally known as *Brucella abortus.*

In Europe, Preisz[19] of Hungary, Nowak[20] of Austria, Zwick and Zeller[21] of Germany, and McFaydean and Stockman[22] of England were among the first whose investigations supported the findings of Bang. In America, MacNeal and Kerr[23], Good[24], W. Giltner[25], Mohler and Traum[26], Moore and Fitch[27], and others in America and other parts of the world have added further evidence to support Bang's findings. At the present there are very few sections of this or other countries in which disease caused by *Brucella abortus* has not been recognized.

Brucella abortus infection in cattle is now not only of great concern to us because of the direct losses caused in the disease produced in cattle and loss of fetus, but because it is receiving particular notice on account of its relation to public health. Evidence gathered recently compels us to accept the conclusion that some cows eliminate in their milk bacteria belonging to the genus *Brucella* which are capable of inducing a disease in

19. Preisz, H.: *Centrbl. f. Bakt.*, 1 Abt. orig., xxxiii, no. 1 (1902), p. 190.

20. Nowak, T.: Annales de l'Institut Pasteur, xxii (1908), p. 541.

21. Zwick, W., and H. Zeller: Arb. der Kais. Gesundheitsamte, xliii (Berlin, 1912), p. 1.

22. McFadyean, J., and S. Stockman: Rep. Dept. Com. app. by Board of Agr. and Fish. to inq. into epizootic abor. Append. to part i, London, 1909.

23. MacNeal, W. J., and J. E. Kerr: *Jour. Inf. Dis.*, vii, no. 3, p. 469-475. Chicago, May 20, 1910.

24. Good, E. S.: Proc. A. V. M. A., 48th Ann. Conv., Toronto, p. 463-476. 1911.

25. Giltner, W.: 15th An. Rep. of Sec. of State B. of Agr. and 24th An. Rep. of Exp. Sta., Mich. p. 155. Lansing, 1911.

26. Mohler, J. R., and J. Traum: 28th An. Rep. U. S. D. A., B. A. I. (1911), p. 147.

27. Moore, V. A., and C. P. Fitch: Rep. N. Y. State Vet. Coll. 1912-13, p. 82.

man which resembles undulant or Malta fever. Soon after the demonstration of the presence of *Brucella abortus* in milk through guinea pig inoculations by Smith and Fabyan[28] and Schroeder and Cotton[29], a search for evidence of its infection in human beings was made. Larson and Sedgwick[30] and Mohler and Traum[26] supplied some evidence that these organisms are pathogenic for man. After Alice C. Evans[31] had shown that a close relation exists between *Brucella abortus* and the organism causing Malta fever in man, further attempts were made to show the relation of the former to disease in man, but it was not until the past five years and especially after the reports of Viviani[32] and Ficai and Allesandrini[33] in Italy and Keefer[34] and Carpenter and associates[35-36] in this country that it became rather generally recognized that symptoms of undulant fever in man may be caused by organisms found also in hogs and cattle.

An effort is now being made to establish differentiating characteristics of the organisms of the genus *Brucella*[37]. Three types or species have been classified: (1) *Brucella abortus,* (2) *Brucella suis,* and (3) *Brucella melitensis,* the organism in goats which cause Malta fever in man. While these separations are not as yet well established, organisms belonging to the three varieties or types have been isolated from undulant fever cases. The *Brucella* organisms found in cow's milk belonging for the most part to the bovine abortus type; nevertheless, a small proportion have the characteristics of either the porcine type or the melitensis type.[37]

28. Smith, Th., and M. Fabyan: *Centralblatt für Bakteriologie,* Abt. 1, lxi, no. 7, p. 549-555. Jena, 1912.

29. Schroeder, C. E., and W. E. Cotton. 28th An. Rep., U. S. B. A. I. (1911), p. 139.

30. Larson, W. P., and J. P. Sedgewick: *Am. Jour. of Dis. of Children,* 1913, Bd. 6, S. 326.

31. Evans, Alice C.: *J. Infect. Dis.,* xxiii, p. 354, 1918.

32. Viviani, R.: *Jl. Policlinico,* sez. prat. 1925, Bd. 32, S. 203.

33. Ficai, G., and A. Allesandrini: *Jl Policlinico,* sez. prat. 1925, Bd. 32, S. 113; Zbl. f. Bakt., I. Ref., 1925, Bd. 79, S. 562.

34. Keefer, C. F., Bul. Johns Hopkins' Hosp., 1924, Bd. 35, S. 6.

35. Carpenter, C. M., and H. E. Merriam: *Jour. A. Med. As.* 1926, Bd. 87, S. 1269.

36. Moore, V. A., and C. M. Carpenter: *Cor. Vet.* xvi (1926), p. 147.

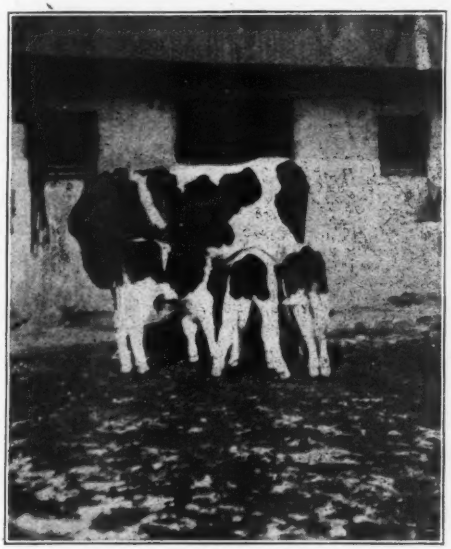
37. Huddleson, J. F.: Symp. Am. Publ. Health Asso., 1929, p. 18.

EPIZOOLOGY

For the control or eradication of the disease, a knowledge of the localization and the channels of dissemination of organisms and the mode of infection is of prime importance.

Calves

In the aborted fetus the organism is most regularly found in the lungs and in the digestive tract; to a somewhat lesser extent in liver, spleen and other organs. Calves born



Bull-Calf Triplets delivered by Dr. H. C. Moyer, Blooming Glen, Pennsylvania.

alive either prematurely or on time to infected dams harbor immense numbers of organisms[38] and eliminate them especially in their feces and perhaps also from other channels. Calves consuming milk containing abortion organisms do likewise.[39] In such calves the infection may be found in the lymph nodes, principally in those of the digestive tract. As a rule, calves will rid themselves of such infections within a short time after exposure ceases[40-41] and no longer be a source of dissemination of the virus.

38. Schroeder, E. C., and W. E. Cotton.

39. Barger, E. H., and F. M. Hayes: *Jour. A. V. M. A.* 1925, Bd. 66 (19), S. 328.

40. Hart, G. H., and G. L. Woods: Hilgardia, 1, no. 10, p. 1-23.

41. Carpenter, C. M.: *Cornell Vet.* 1924, 16, 16-31.

Cows

Data gathered to date, although not as complete as desired, indicate that heifers become more susceptible as they reach sexual maturity but are practically so after conception and the development of the fetus progresses. The organism then localizes itself in the placenta, both fetal and maternal, particularly the former, in the uterus, the fetus, udder and supremammary lymph nodes. With expulsion of the fetus and the separation of the afterbirth, the bulk of the infection in the uterus is eliminated. This is probably the greatest source of danger and the greatest means of the spread of the disease. The uterine cavity may continue to harbor and expel *Brucella abortus* bacilli for a period usually not longer than a month. In some cases it has been found as long as 65 days after abortion.[46] In the milk, however, the organism may persist for years and may be eliminated in this fluid regularly or intermittently.

The Bull

It is generally accepted on a fair amount of evidence that bulls are more resistant to *Brucella abortus* infection than mature females. Nevertheless, positive agglutination reacting bulls and bulls with lesions caused by *Brucella abortus* in their genital tracts have been reported.[48] However, attempts[44-45-46] to estimate the importance of bulls in the spread of this infection by copulation indicate that he does not play an important role in the transmission of the disease. Nevertheless, since the male genital tract may be diseased and the elimination of the organism either through the urine or the semen or both may take place, an infected bull should be considered a menace to a clean herd. Lothe[44] has shown that in herds free from *Brucella abortus* infection, bulls may be responsible for infection of the female genital tract with another virus which may cause abortion.

43. Buck, C. M., Creech, G. T., and H. H. Ladson. *Jour. Agr. Res.* xvii, no. 5, 1919.

44. Lubbehuser, R. E., and Fitch, C. P.: *Jour. A. V. M. A.*, 1926, N.S. 2, p. 467-480.

45. Hadley, F. B., and H. Lothe: *Jour. A. V. M. A.*, 1916, Bd. 50 (3), S. 143.

46. Cotton, W. E., *Vet. Med.* 1924, xix, p. 436-469.

Diagnosis

The methods of diagnosing *Brucella abortus* infection have, within recent years, been improved. Stained smears of the utero-chorionic exudate and especially smears of the involved intercotyledonary surfaces of the chorion frequent enable one to make a diagnosis within a short time.[47]

California Triplets

When such material is not suitable or available for microscopic examination, cultures from fetal lungs and digestive tract may establish a diagnosis within a few days, and when neither of these is possible, guinea pig inoculations with fetal or placental material will bring a definite answer within six weeks.

The seriological tests, both complement fixation and agglutination, have been used; while both are practically of equal value, the more complicated complement fixation test is not as frequently employed as the simpler agglutination test. The latter test, in spite of some limitations, is of extreme value in establishing the approximate amount of infection in a herd and when a series of tests are made is of value in establishing the status of individual animals concerning infection with *Brucella abortus*. The agglutination test has made it posible to eradicate the disease in a good many herds in this country and other countries, and has been organized as a method of combating the disease.

47. Hagan, W. A.: *Cor. Vet.* 1926, xvi, p. 274-279.

Abortion, Its Prevention and Control

By F. B. HADLEY, Madison, Wisconsin
Wisconsin College of Agriculture

THE new plan for the control and eradication of contagious cattle abortion recently inaugurated by the Wisconsin Live Stock Sanitary Board has a number of interesting features. Not only is it novel, and so introduces some new ideas, but it also brings into the picture the practicing veterinarian who will be the "contact man" between the cattle owner and the state officials.

This plan is still in the experimental stage, but is being adopted so generally and with such enthusiasm by both practitioners and live stockmen that it seems safe to predict it will be a success. At any rate, it is a distinct improvement on any plan yet tried, if for no other reason that that a much larger number of cattle can be tested within a given period.

The basis upon which the plan rests is the agglutination or blood test and the acceptance of this test as the only means at present recognized to furnish the information required to establish the diagnosis.

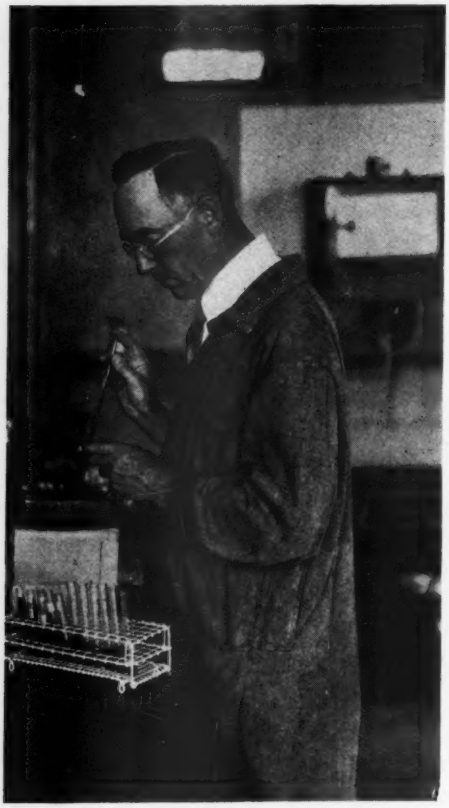
Necessarily the plan involves the approval of veterinarians capable of doing effective work in the control of this infectious disease. To receive such approval and be granted a permit entitling him to nominate herds for a certificate, the veterinarian must satisfy the administrative officials that he knows how to apply the blood test and appreciates the responsibility of interpreting it. Among the conditions specified is one to the effect that the veterinarian is required to collect the samples of blood and may test them himself, or have them tested by some qualified person. To safeguard the interests of the Live Stock Sanitary Board, it reserves the right to check-test any herd, at any time and to revoke the permit of veterinarians who are found incompetent or dishonest.

Another significant requirement is that the application for a certificate, showing that a herd is negative to the blood test for contagious abortion, must come from the herd owner through the veterinarian. This is to insure the filing of means for identifying each animal in the herd, as well as for the filing of the results of the blood test, and of the breeding history. No certificate will be issued until the veterinarian attests that the entire herd, with the exception of animals under six months of age, has been tested three times at intervals of approximately six months, and that no reactors were discovered in any of the tests.

The owner agrees that he will introduce no cattle into his herd until they have passed the blood test, made by an approved veterinarian, within ten days prior to the date of introduction, unless the animal comes from a certified herd. He further must agree to keep his cattle from association with untested cattle, and also to report promptly any case of abortion in his herd, and to remove it at once and to have his entire herd retested within thirty days. The certificate must be renewed after one year, such renewal being contingent upon another negative test on the entire herd.

To assist veterinarians in securing the most up-to-date information available on the agglutination test as a diagnostic agent for cattle abortion, the Wisconsin College of Agriculture, as well as a representative of the Wisconsin Department of Agriculture, is conducting a series of demonstrations to groups of veterinarians, both at Madison and in different parts of the state. These have been very effective in helping the practitioners to appreciate, through having seen and studied the abortion organism, what it is and how it is used in making the test. By actually making tests themselves they learn how to use pipettes, antigen, and

other equipment needed for testing. This not only gives them a chance to develop the necessary technic but also confidence in themselves as technicians. They are told how important it is to consider and read into the results of the blood test the herd history before attempting to



Doctor Hadley making the rapid Agglutination test for Abortion Disease.

outline a plan of herd management. The latter gives them an appreciation of the responsibility that rests upon them in advising farmers how to manage their herds.

Borderline, or incomplete, reactions are discussed, as well as the effect of vaccine and bacterin on the serum reaction. An opportunity to draw blood samples is provided, as many veterinarians who have attended these demonstrations have frankly stated that they did not feel proficient and wished to learn how they could draw 50 or 60 samples per hour as some of their fellow practitioners state they do.

It is important to recognize and interpret properly the various types of reactions met with when using the rapid agglutination method for testing blood serum for abortion. Blood serum from a typical case of infection with *B. abortus* gives a clean-cut reaction, i. e., complete agglutination with .002 cc., the smallest amount usually employed in routine testing. It is customary to interpret as positive any serum that reacts with .02 cc. or less. The animal from which such serum was drawn is said to be infected or to have been vaccinated or bacterinated, as the infection of both living and killed cultures of *B. abortus* stimulates the production of specific antibodies. The test does not distinguish between naturally infected biologically treated animals.

The interpretation of the so-called borderline, doubtful, or incomplete reaction, in which only partial agglutination occurs with .02 cc. of serum, is not easy. In these cases the abortion history of both the animal under test as well as that of the herd must be considered. In order to safeguard the interests of all parties concerned, it is best to give the cow the benefit of the doubt and to hold her subject to a retest after 60 or 90 days before deciding upon the final diagnosis. In the interim such animals, especially if they are pregnant, may well be isolated.

To date, definite projects for cooperative control work on a purely voluntary basis already have been started in 13 Wisconsin counties. Local veterinarians in each of these counties, through the instruction provided as above mentioned, are testing herds and filing results for use in the future when applying for certificates showing that all the animals in a given herd are negative to the blood test.

A progress report by a veterinarian in Washington County who has already tested many herds indicates that on the first test a considerable number of herds have been found that contain no reactors; in a few all of the cattle reacted; in some they split fifty-fifty. In the great majority of herds in which the infection was diagnosed it was limited to relatively few animals.

In herds where the test reveals a large fraction of reactions the problem of control is a serious matter, especially for the man who has limited stable facilities, thus making it impossible for him to maintain postive and negative herd units. The veterinarian is called upon to decide whether to vaccinate, to prescribe medicines or minerals, or "to trust in God." One experienced cow man says he would discard science and plod on as many others have done and are doing with the hope that the infection would eventually limit itself by the older animals establishing an immunity. These statements indicate that there is yet much to be learned about abortion control and treatment. However, it is certain that something more tangible will grow out of the various methods now being tried in different states.

While the live stock authorities of some states have made contagious abortion a reportable disease, the Wisconsin officials feel that for the present they should not so consider it. One reason for this is that no practicable method of handling reactors can be projected at present. Therefore, until such time as it seems desirable to require the reporting of every case of abortion and every reactor to the blood test, the responsibility of protecting the industry should be assumed by the cattle owners themselves. Primarily they should be more vitally interested than anyone else. Moreover, the authorities feel that they are doing all that can reasonably be expected by providing facilities for educating local veterinarians to perform the test and by recognizing tested herds.

It does not seem rational to expect much in the way of results from the rules of those states requiring the blood test on all dairy cattle before importation, unless the herds of which these cattle are to become a part are also tested and kept clean, and unless the abortion disease is made reportable. This would require rigid laws, statewide regulations, and a large force of field veterinarians. Even if all these were provided, the program would not be effective on account of the extent of the dairy industry and the prevalence of abortion infection.

Credit should be given to the Wisconsin Veterinary Medical Association for using its influence to further the abortion control work and to secure for the members of the profession a more general participation in it. The association has felt for a long time that the practitioner is the logical man to be given the responsibility, as his contacts with the herd owner afford him the information essential to an understanding of the problems involved and his knowledge of disease the basis for suggesting measures for their solution. The opportunity which he now has in Wisconsin to show what he can do is an exceptional one. All who have the welfare of the cattle industry at heart wish him success. It is evident, however, that he must be on guard at all times against mistakes in the application of the test and in the advice he gives herd owners. One error in judgment, or carelessness in any detail, will raise doubt as to the efficiency of the test as well as to the ability of the man who made it.

Whether this Wisconsin plan, which has yet to be given a fair trial, will accomplish as much as its proponents hope remains to be seen. However, live-stockmen in Wisconsin are confident that the plan has more to recommend it than have some of the plans adopted by certain other states.

The Control of Bang's Disease

By C. P. FITCH, University Farm, St. Paul, Minnesota

THE control of any infectious disease depends upon knowledge of its fundamental biological characters. In some countries the Bang method for the control of bovine tuberculosis has been used extensively for many years. In this country this plan has never been successful, and it was not until the general application of the tuberculin test with the destruction of the reacting animals, that tuberculosis among bovines was successfully combatted in the United States. Research and demonstrations have shown that bovine infectious abortion or as it is now called Bang's disease can be successfully controlled on the basis of the application of the blood test, and the segregation or slaughter of the reacting animals.

Since 1920 the state of Pennsylvania has proceeded with this plan of abortion disease control, until today they have more than three hundred herds accredited as being free of this infection, and more than two thousand herds in which they are carrying on work leading toward the elimination of the disease.

The use of biologics in the control of Bang's disease has not yet proved satisfactory. Further research may develop some medicine or vaccines which will be efficient in the prevention or cure of this disease. We should not wait however, until such a product is developed until we start or initiate rational and economically sound procedures looking toward the actual elimination of the infection among cattle.

Plans put in operation by the Minnesota State Live Stock Sanitary Board for the control of this disease, consist of three separate and distinct agreements. These are known as Plans A, B, and C. Plan A is essentially the accredited herd plan of the Pennsylvania Bureau of Animal Industry.

Plan B is the so-called approved herd. In this the owner agrees to the testing of the animals and the separation of the infected from the clean. The infected animals however, may be kept on the same farm, the only restriction being that there shall be no physical contact between the infected and the clean group of animals. An approved Bang abortion herd certificate is issued after no evidence of the disease is found in a single blood test of all cattle, including all calves in the herd.

Plan C is the so-called cooperative Bang abortion disease control plan, and all that is implied here is that the owner shall agree to have his entire herd tested regularly at least each six months and to adopt such sanitary measures as may be recommended in his individual herd by the State Livestock Sanitary Board. These sanitary requirements will be the proper disposal of the fetus and fetal membranes, the isolation of aborting animals, and cleaning and disinfection of the stable. In other words there is nothing in Plan C which any farmer cannot put in operation on his farm.

Plan B is based upon the experimental work conducted in the Division of Veterinary Medicine at University Farm. This experiment was published in full a short time ago. Two herds of cattle were maintained within 50 feet of each other. One of these herds was affected with Bang's disease, and one was free of the infection. During a period of five years in which these herds were taken care of by the same men, only three cases of infection occurred among the clean group. The infected herd consisted of approximately 10 animals and the clean herd of approximately 20 animals. During this interval the calves from the infected herd were allowed to nurse their dams until approximately four to six months of age

when they were tested, placed in quarantine and all became negative except one. After this they were placed in the clean herd.

It is not a difficult job to build up a herd free of Bang's disease from one that is infected. At the present time there are a number of herds in the State of Minnesota, which have been freed of this infection according to this plan. One herd consisting of more than 86 animals on the first test in July over two years ago, had more than 30% animals positive to the agglutination test for Bang's disease. These animals were immediately eliminated and placed in a separate herd in an adjoining barn. Separate pastures were provided. On the next test of the clean herd in September, one additional reactor was found. Since that time the herd has been maintained free of the infection. This is a single illustration of many herds in the state which have been cleaned up from this disease. The test tube or long agglutination test is used in all of this work, and it is the only one which is officially recognized by the State Livestock Sanitary Board of Minnesota at the present time.

These methods of controlling Bang abortion disease bring up many puzzling questions. One of those that is exceedingly complicated is what to do with the animal reacting to the test. We do not believe at the present time that this animal should be branded. All those that have had experience in Bang abortion disease, know that young animals may after a period of years, free themselves of the infection and become negative. If these animals are branded, tested in the future and found to be negative, it will not be long before the people will lose confidence in the test. In tuberculosis the question of the reacting animal has solved itself, namely she is slaughtered at once, and there is no opportunity for further test.

Some states notably Iowa, have recently passed laws or regulations prohibiting the entrance of animals within their confines, except on tests that they are free of Bang's disease. This immediately presents a problem to those states from which animals are shipped. A carload of cattle is purchased in a respective state and tested for Bang's disease. Some reactors are found. The problem that arises is, should these animals be consigned for immediate slaughter? It is a well known fact that certain animals that are positive to the blood test for Bang's disease are nevertheless good breeders, and will give a calf approximately every year. Some of these animals are of excellent blood lines, and it does not seem reasonable that they should all be sent to immediate slaughter, at least not yet.

Plan B which was adopted by the Minnesota State Livestock Sanitary Board seems to offer a solution for those who cannot immediately rid themselves of all reacting animals. It is surprising how soon the reacting group disappears of its own accord. In other words the animals become sterile or for other reasons become unprofitable to maintain. In two herds which I have in mind the reacting group has diminished to less than three animals in a period of approximately a year and a half. In each instance there were initially in excess of ten animals in each reacting group.

The problem presented by the control of Bang's disease is not so difficult as some people would wish you to believe. Each individual herd must be considered as a single unit and the veterinarians advise the procedure which seems best in the particular case. It should be kept in mind, however, that the ideal in each instance is a herd free of the disease on the basis of the blood test. It will not be long before the public is going to demand that raw milk come from animals that are free of Bang's disease. This is just one added reason why breeders of cattle should immediately start to clean up their herd from this infection.

Sterility in Cattle

By J. F. DEVINE, Goshen, New York

IT IS at once apparent that not to crowd out important articles on cattle practice in this number, an article on sterility must be principally introductory, with no thought of dealing exhaustively with any of the impediments associated with sterility. There are but two possible ways that I know to write an article of this sort.

One would be to present much of the information which we have, which meagre though it is, would require several issues of this journal to include it.

The other is to approach the subject as one might in a lecture to a class of practitioners.

After visiting with a large number of cattle practitioners in the United States and Canada and attending, as I do, many meetings each year, in different sections of this country, I find our colleagues, interested in breeding problems, (a far better name than sterility) are torn by conflict between at least two classes.

One is the so-called ultra-scientific men who have no patience with the practitioner whose knowledge and experience is limited and the other—and perhaps the more dangerous—is the fellow who poses as an expert and dispenses much advice before his utter ignorance on the subject is discovered. By following the latter's advice, the practitioner may do incalculable harm to his reputation in his community, which perhaps discourages him and gives him reason for condemning everyone attempting to teach this work.

Naturally, as in most things, there is a middle way. The subject is not as simple as docking and castrating; but I have found, as I go about on consultation work, that the average veterinarian, especially the one who is particular in his every day practice about the way he does things, especially as to surgical cleanliness, can be taught easily to do the simple things and do no harm. Fortunately the cow will stand a great deal more abuse than the mare. But even with the cow, there are ever present certain dangers for the novice or crude operator. One can place a crude forceps on a cervix, tear and infect it; he can likewise open and infect uteri that should never have been touched and probably induce adhesions, making breeding hopeless in an animal that might otherwise have bred, had she received the proper treatment and no abuse.

As in all things associated with surgical procedure, a knowledge of the normal anatomy is of first importance. I know of no better way to get this knowledge than to make examinations at every possible opportunity. This we can do in our general practice when examining patient for almost any cause and, if the examination is made in a clean careful manner it should not in any sense aggravate an ordinary illness. Then there is the abattoir, which is a particularly good place. When I began giving attention to this work, some twenty years ago, there was no literature available on it and had I not had access to a nearby abattoir, I surely would know even less than I now know about the subject.

On the other hand, I have repeatedly said to men who are in earnest about this work, that, with a little help, it should be possible for them to learn more in one month today, than some of us learned in five years, in the past.

The first thing is to acquaint yourself with the normal cervix, uterus, ovaries and tubes, keeping in mind that they vary, depending on the age of the animal, the breed and size, and whether virgin, primapara or one that has had several calves. One must always reckon with the asymmetry of the horns, in animals that have borne several young. For instance, if we should take a middle-aged cow, one that has had several calves in the right horn,

that horn will, when non-gravid, approximate the size of what the left would at six weeks pregnancy, providing that it were the first pregnancy of the left horn. In addition to this, it will have much the same feel excepting a gravid horn gives evidence of containing fluid to the experienced fingers.

After one has learned to locate the organs, without the use of instruments, and instruments are absolutely out of place in an ordinary examination, then the next thing of importance is to be so careful in every procedure as to not abort an animal that you are called upon to examine. With the hope of helping my fellow practitioner on this point I have prepared an article on the diagnosis of pregnancy, which will be found elsewhere in this issue.

Assuming we are now in a herd, say of from fifty to one hundred cows, with some fifteen or eighteen animals to examine. These are giving more or less trouble or we would not have been called, what are we apt to find? This will depend on many things. Perhaps one of the things that we are ever dreadful of is infection, and when we think of infection, we think of the Bang organism, producing, as it does, cotyledonitis and placentitis with the resulting retained placenta, endo-metritis, cervicitis, and in some cases, adhesions. Consequently, infection is rightfully regarded as one of the most likely causes of the trouble.

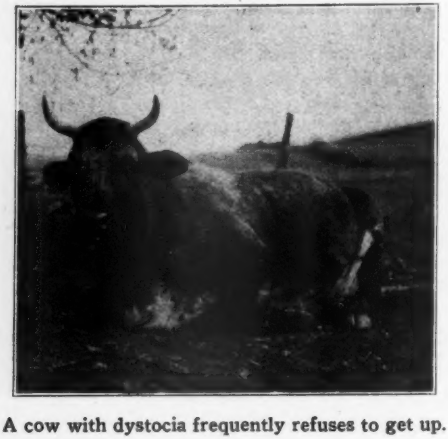
Then again, we must take into account whether this herd is working under high pressure. If so, we must not overlook nutritional imbalance.

Only recently, I was called in consultation with a colleague to examine the world's record Jersey cow. She has not had a calf in nearly three years, no evidence of infection whatever, just simply milked to pieces. Her ovaries are cystic and her uterus flabby, thin and lifeless and has the feel of a handkerchief soaked in oil. Probably present workers on nutritional balance would describe it as hypocalcemia or hypophosphatemia, perhaps as aphosphorosis. Irrigating her uterus and other such foolish acrobatics would be of no use. The first thing to do is to try to build back her nutritional balance if possible. If, from repeated examination of her organs, and the general appearance of the animal she seems to be improved then crushing the cysts at regular intervals of not more than five or six days apart and rolling the uterus between the two hands (which is termed massaging and which some, with little knowledge of the subject, question its merits) will be in order.

Let us take a case in point. I have just sent from my paddocks, near my laboratories, a beautiful Jersey cow, that cost about $6,000.00, some four years ago. She was with calf when she was bought; dropped a normal calf at the age of four years; was put on test, milking over eight tons of milk and nearly one thousand pounds of butter fat. They delayed breeding her until the sixth month, with the result that she did not conceive after repeated services. A veterinarian, who is interested in breeding troubles, and his father who is a veterinarian, treated the animal carefully and capably, with particular reference to uterine irrigations for about two years, but with no avail. We were called in consultation and, while there was a slight discharge around the cervix, which is perfectly reasonable to

Triplet calves delivered by Dr. B. W. Conrad, Sabetha, Kansas.

expect, when these organs have lost tone and the normal germicidal secretions are lessened and particularly after instrumentation, still it was our judgment that her trouble was largely, if not solely nutritional. It was arranged to send her to our hospital. For the first three months, sole attention was given to her diet, feeding her what we consider the proper mixture of calcium, phosphorous and yeast. Her physical condition, which was very bad, gradually improved. She took on flesh, notwithstanding, that she got but two pounds of grain daily, just enough to induce her to eat the mineral and yeast mixture. After a couple of months she began having normal heat periods, which had not been the case for nearly two years. We douched her vagina with an alkaline solution, massaged her ovaries and uterus a few times and had her bred. She did not conceive from the first service but, as her organs seemed in every way normal and clean and her condition good, we did nothing more for her but bred her again. She conceived from the second service, which was confirmed by an examination, some seven weeks later, and was then returned to her owner, who was so pleased, he offered a check for twice the amount of our charge.



A cow with dystocia frequently refuses to get up.

I cite this case particularly to point out the unfortunate prejudices of different ones on this subject. One man will ridicule irrigating the uterus, for any reason, which, of course, in the case of pyometra, severe chronic endometritis and cervicitis is of positive aid, if done with a solution of any preparation that will actually cleanse, do no harm and stimulate the normal germicidal secretions. For this, my choice is sterilized sodium chlorid triturated with permanganate of potash.

Another man wants to douche every uterus, which is positively ridiculous and still another man will douche a cervix with a few drops of water leaking from a little reservoir hung up, which to my mind is literally wasting his time, while others will advocate great quantities of hot water thrown against the cervix with force. This latter and the proper use of bacterins, is the method I prefer.

Perhaps I could answer any criticism of this method by stating there have been many, many cases of chronic cervicitis sent to our hospital that have been treated over long periods by others and finally condemned and that nearly every one of these have been sent home either in calf or ready to breed. We all realize this could happen once in a while, but when I state many, I mean many. So naturally I can recommend this procedure to my brother practitioners, as results are the thing and the only thing that keeps the practitioner going.

Perhaps the best thing I can say to the inexperienced to give him hope and courage is:

First, understand the anatomy, always improve every opportunity by examining normal and abnormal animals, then practice with great care and particularly guard against too much instrumentation.

We must ever be on the alert for erroneous breeding history. I have mentioned before the fact that I was once asked to go to South Carolina to examine a very expensive imported pure bred-white face. The history was that she had calved some seven months before and had not had any heat periods since. However, I found a five-months calf. When

I informed the herdsman that the cow was with calf, he explained to me that it could not be possible as the nearest bull was two miles away and the cow had never been taken there for service or out of the field near the stable. However, the fact that she dropped a normal calf in due time settled that.

But that is simply one of a number of cases, where I have found animals pregnant that were being examined on account of *bad breeding histories*. So watch out.

I repeat, I regard the diagnosis of pregnancy as perhaps one of the first and most important steps for the man new in the work.

To sum up, some of the things we may find when called to examine a cow that is not breeding are:—

1. She may be pregnant.
2. She may show evidence of infection, manifest in many ways, either by cervicitis, endometritis, pyometra, cystic ovaries or adhesions. Several of these conditions may exist in the same patient.
3. Nutritional troubles must not be overlooked.

Malformations may exist even in the cow that has had one or more calves. I recall one case of absolute occlusion of the vagina by adhesion of its walls in a cow that had had two calves previously.

4. There is what I have for convenience termed the "left handed" cow, that is one in which the right ovary is not functioning. We usually find one or more of these in every good sized herd, that is giving trouble. Cows do not conceive as easily and as regularly from the left ovary as from the right one. Don't ask me why. The architect did not consult me in the making.

5. Then we are quite sure to find some cows that need nothing but daily douching of the vagina with an alkaline solution a week or so before being bred. In other words, there is just enough of a catarrhal condition to entangle or kill the semen and douching takes care of that. Here is where the quack sometimes wins out by "opening them up." If his hands were not too filthy, he cleans enough of this accumulation away and, by manipulation, excites secretions sufficiently, in some cases, to allow the animal to conceive.

Cows that are apparently normal (and I receive letters daily describing such cases) probably are in some cases as normal as can be determined, but we must not forget there are many minute changes that cannot be detected by the eye or the fingers. When these animals are stabled have them douched a few times weekly for a while, put them on a mineral and yeast mixture and turn a potent bull with them. The probabilities are they are not ovulating normally and should be bred oftener than if normal. If they have not conceived by spring, a hillside and a vigorous young bull is the best treatment we know of.

In any case do not overlook the bull as possibly responsible for a greater or less degree of sterility in the herd; particularly if he be aged. He may appear normal and yet produce spermatozoa of low vitality.

The abnormal drain on the vitality, the depletion of fats and minerals, the overload on the reproductive organs and the taxing of the digestive system in high-producing cows are fundamentally responsible for a large part of the sterility in high-bred dairy animals. Infection plays a secondary, albeit an important role in many cases.

Diagnosis of Pregnancy

By J. F. DEVINE, Goshen, New York

I HAVE repeatedly emphasized the importance of diagnosing and differentiating pregnancy, particularly early pregnancy, from pathological conditions of the uterus that might simulate pregnancy; in other words, the differentiation of pregnancy, so as to avoid the killing of the delicate embryo by severe manipulation of the horn or horns; or the equally certain death and expulsion of the fetus by pressing out of the ovary, what is termed the true corpus luteum, or the corpus luteum of pregnancy.

I confess that I do not know how to sufficiently emphasize this danger, as it seems to be one of the most common and constant errors of inexperienced operators, and I doubt if there is any other thing that so enrages an owner as to have a veterinarian abort an animal that the owner has been sufficiently anxious about to consult an expert to determine if possible why the cow has not bred more promptly or why she is not showing regular periods of estrum.

I have repeatedly cautioned against the unreliability of any breeding history that may be presented to us. It matters not how accurate the records are supposed to be kept, or how certain the attendant is as to his information, we must not let this mislead us. The information we gain from examination must be our guidance and other information simply accessory.

It is not an easy matter to give instructions for the diagnosis of early pregnancy, still there are certain things that aid us materially, and when combined make a diagnosis about as accurate as most things we do.

The history will usually be of some value, particularly where an animal has been a regular breeder and has passed one or more periods of estrum, but when it is desired by those in charge, as is so often the case at the present time, in large herds, that the animals be examined to determine definitely whether or not they are pregnant, so that there will be no delay in giving the necessary attention to have them breed at the desirable time.

It is common knowledge that ordinarily when an animal conceives, she ceases to have periods of estrum, but this is not always the case; we not infrequently see cows take the service of the bull at regular or irregular intervals, during a part or the whole of the period of pregnancy; consequently this weakens the reliability of the cessation of estrum. Conversely, animals that are not pregnant, ordinarily have regular or irregular periods of estrum, but again very often a corpus luteum fails to be absorbed between the estrual periods, and such will cause a cessation of estrum for an indefinite period, just as certainly as a corpus luteum of pregnancy; therefore from the minute we enter the vagina, until we have examined carefully the cervix, horns and ovaries, it is well to proceed with the most delicate touch and careful manipulation.

How Early Can Pregnancy Be Diagnosed?

The question is asked frequently how early can pregnancy be diagnosed? I can best answer that by stating that in herds where I make regular examinations to verify the records and to determine if the animals are breeding, unless there is some particular reason, I prefer not to examine an animal for pregnancy, until at least five, and preferably six weeks after it has been bred. I will admit that where the organs are ideally normal, and if upon examination the cervix be found closed tightly and the vagina sticky, particularly near the cervix, and there is found a distinct asymmetry of the two horns, but not asymmetry enough to give any definite information by palpation of the horns alone, and if in addition a distinct corpus luteum be found standing out on the ovary, corresponding to the enlarged horn, and the history is that the animal was bred four weeks previous, one would doubtless be justified in stating that she was four weeks'

pregnant, but this is an ideal co-ordination.

But, on the other hand, in examining an animal that has been bred four weeks, one may find a cervix that in no way indicates the formation of a seal, even though the animal be pregnant. One may also find in a middle-aged cow that has been bred several times, two horns similar as to size, particularly if she is this time pregnant in the left horn when her previous pregnancies have all been in the right horn; or if there is a slight asymmetry of the horn, one may fail to outline a distinct corpus luteum in that ovary, even though she be pregnant; with the result that one finds one face to face with the proposition that it is either a pregnant horn or a horn slightly catarrhal.

If the ovary is enlarged and one is in doubt whether it is a true corpus luteum or a cystic degenerated corpus luteum, there is no way to determine except by putting sufficient pressure on the ovary to remove the corpus luteum of pregnancy if there be one, or to crush the deep-seated cyst or cystic corpus luteum, if that be the case. The natural and safe thing to do is to leave the ovary and horn alone, for at least two weeks longer.

The result of such an examination is unsatisfactory both for the veterinarian and others, which is the reason why, as stated above, that unless there is some particular reason I prefer not to attempt to diagnose pregnancy under six weeks.

On the other hand, it is my belief that six weeks' pregnancy is practically one hundred per cent diagnosable. When the rectum has been emptied, the cervix is grasped with one hand and drawn gently back, and with the other hand in the rectum on the floor of the pelvic cavity or just anterior to it, the uterine horns will be found. The bulk of the fetus and its liquids, and the thinness of the uterine horns at this early period are really quite astonishing. It already has assumed the feeling of an intestinal horn filled with liquid, and in those uteri in which the horn enlarges in circumference rather than in length, it is just about the size that man's hand can cover nicely; thin

Occasionally one finds a uterus in which the enlargement seems to affect the entire horn rather than the middle part. In these cases the fluctuation and pronounced thinness of the horn, is not so noticeable, and it is well to follow the enlarged horn to its end and gently locate the corpus luteum of the ovary, or an enlarged ovary indicating a corpus luteum.

After one has palpated a few horns of this type, they are usually as readily diagnosable as one in which the fetus and fluids are more circumscribed.

Changes Easily Noted

From six weeks on there is such a daily increase in the size of the pregnant horn that it is almost perceptible from day to day, so much so, that after one has had considerable experience in examining pregnant uteri, one can often be of service in straightening out the breeding records of a herd, it being possible, usually from six to twelve weeks, to determine the age of a fetus to within at least three or four days. After twelve weeks the uterus, from weight, begins to draw ahead gradually and while one can plainly palpate the top and sides of it, still ordinarily one cannot raise it in the hand and get the full outline so as to estimate the size, as can be done earlier. It is well always to locate the non-pregnant horn, in very early pregnancy if at all in doubt, and it will be found somewhat like a small appendage growing out from the pregnant horn; and if still in doubt as to the diagnosis, the cervix may be drawn back and examined more closely to determine if a seal is forming. If a seal is plainly visible, it is of course a very good indication of pregnancy, which is also true in cases where the seal is not visible, if particles of the seal adhere to a small catheter passed part way into the cervix; but again a substance closely resembling a seal is occasionally found in the cervical canal of a non-pregnant animal, or unfortunately any evidence whatsoever of a seal may be quite wanting in a pregnant animal. However, all of this confusing examination is unnecessary to the experienced and fluctuating.

operator, if the animal is six weeks pregnant. In twin pregnancy, naturally, there is not the asymmetry of horns, but there is the same fluctuating enlargement with the thin firmness of the horn walls to differentiate it from catarrh of the uterus, and the thin smooth feeling, with the quick moving liquid, to differentiate it from a uterus suffering from pyometra, with a denser feeling and a slow moving liquid.

From the third month on there is naturally considerable change in size and form of the uterus, to accommodate the volume and position of the fetus and its membranes. The walls become tenser, the fetal fluids are quite easily recognized and from about the third month on the cotyledons may be palpated, and at the fifth month it is sometimes possible to palpate the fetus floating in the fluids, becoming more and more recognizable until about the sixth month, when the fetus may rather suddenly drop to the floor of the abdomen and be entirely out of reach, until around the eighth month, but one is always justified in suspecting advanced pregnancy when, on entering the vagina, the cervix is found pulled well forward. These suspicions are further substantiated even if one cannot locate the uterus, but finds the fundus drawn as a flattened band over the anterior border of the pubis. At this period of pregnancy much reliability may be placed on the enlargement of the middle uterine artery, which is usually enlarged to one-half inch in diameter and the throbbing is plainly felt through the rectal wall.

It is true that a growth in the uterus might be of sufficient weight to draw it down, as does the fetus, but in such cases the absence of the enlargement of the uterine artery and other obtainable information, such as the last breeding date, may be of assistance in the diagnosis.

Fortunately, from the seventh to the ninth month there are certain changes in the size of the abdomen and the position of the fetus, which enable one usually to get rather definite information as to the approximate age of the fetus.

When the fetus acquires sufficient weight to pull it downward and forward on the abdominal floor, the anterior extremity of the gravid uterus lies close to the diaphragm. The weight of the fetus and the horizontal position of its body tends to keep it in an anteroposterior position. By the arrangement of the circulation, the anterior portion of the fetus in early life receives more arterial blood than the posterior, which causes the anterior portion, from greater weight, to rest downward and toward the fundus, rather than toward the conical extremity of the horn, but later, when the hinder parts become more developed, they exceed in weight the anterior part of the body. By this time the uterus is lying upon the abdominal floor and naturally the posterior part occupies the lowest point, with the head still pointing toward the fundus, and, owing to the size of the fetus and the shape of the horn, the fetus has a fixed position, hence the majority of presentations are anterior.

The position of the fetus also explains why, when attempting to locate, say a seven months' fetus, by ballottement, it may be necessary to reach quite under the abdomen; while as pregnancy advances it becomes much simpler to locate the fetus in the right flank, there being a gradual advancement backward and upward toward the pelvis, until near the end of pregnancy, when the anterior extremity of the fetus approaches the inlet of the pelvis; consequently, when once the fetus can be located by ballottement, one can again get fairly accurate information as to about the period of gestation, from the location of the fetus from the outside, which of course may be confirmed by rectal examination if desirable.

Electric lighting may temporarily increase egg production during the short-day period, that is in the fall and winter, but there will be a decreased egg production during spring and summer. Thus artificial light results in a relatively uniform egg production throughout the year and there is an increased production during the high-price season.

Calf Scours and Calf Pneumonia

By R. A. McINTOSH, Guelph, Ontario

THESE two conditions affecting the young of the bovine species are frequently met with in cattle practice. While it is true that they occur independent of each other, nevertheless scours is commonly followed by pneumonia and in many outbreaks there apparently is a definite relation between the two. Any veterinarian with much experience in cattle work will at once acknowledge the truth of the concurrence of these two diseases in many instances and he also recognizes the fact that he has considerable of a problem on his hands. It is not intended in this article to theorize on the etiological factors of either of these diseases but rather to accept the known causes and deal with the diseases in as practical a form as possible.

White Scours is an acute infectious disease which attacks young calves early in their life. It is characterized by a profuse diarrhea and rapid exhaustion of the animal's vitality. Various investigators have found a number of bacteria responsible for it but the concensus of opinion places a virulent colon bacillus as the most frequently found causative agent. In discussing the cause of the disease other factors should not be lost sight of which unquestionably have a bearing on the occurrence of it. This disease is most commonly seen in herds where abortion disease and genital infections are prevalent, in herds in which there is but little recognition of sexual hygiene, and again in herds where the facilities for sanitation and the proper care of the newborn are lacking. Overstocking and mismanagement of the feeding and feeding utensils also are contributing factors. Natural infection may occur in a number of ways. It may occur during intra-uterine life. This fact may explain the cases in which the disease is manifest shortly after birth. If a cow conceives with an infected uterus the infection may become a part of the fetal alimentary content and lie in a more or less dormant state until the calf is born and partakes of milk. The milk swallowed at once provides a suitable media in the digestive viscera of the calf for the propogation and development of disease producing bacteria. In infected stables the organisms may be present in the vagina of the mother, on the floor or in the litter. Discharges emanating from the genital tract after parturition may also contaminate the udder of the cow and when the calf nurses infection takes place. Careless and dirty handling of the milk fed to the calves and the utensils with which they are fed provides another means for the spread and ingestion of the infection.

Outbreaks of the disease are most commonly seen in the spring and fall when the seasons are changing but may occur at any time of the year. The earlier in life calves become infected the higher the mortality. Older calves seem to develop a certain amount of resistance and do not succumb so rapidly or quickly. Practically all writers are agreed that the first manifestation of the disease is an elevation in temperature associated with increasing dullness and lassitude. Affected animals soon lose their appetite and quickly become exhausted. The hair stands on end, their breathing indicates weakness and they lie down a great deal. In the course of a day or two diarrhea is manifest, the surface of the body and the extremities feel cold, and the eyes become sunken. The fecal discharges are at first yellowish, later white and more liquid in character, sometimes foamy and blood streaked and always very fetid. Ultimately the anus may remain dilated and the feces dribble away soiling the buttocks, tail and other related areas. Under the influence of the disease the loss of flesh is very rapid, the animal becomes incapable of standing, becomes comatose

and dies. In the later stages of the disease the temperature may be subnormal, the heart's action is fast and weak ultimately becoming scarcely perceptible. In some cases there may be evidence of pyosepticemia and arthritis indicating the congenital origin of the disease.

On occasions the diarrheic condition is not so severe but owing to the lowered vitality of the affected animals and to the prevalence of organisms capable of producing respiratory lesions a pneumonia develops. As a rule the first indication of it is a hacking cough. Suddenly it may become quite severe due in all probability to the increased virulence of the organisms responsible for the pneumonia. Other members of the calf herd become affected and a number may die in a short time. It has been noticed, however, that even in herds where calf pneumonia seemed to be the primary disease, digestive disturbances were quite evident. The inflammatory reactions in the lungs are typical of a broncho-pneumonia and the course and symptoms presented are of this character. First the dry harsh cough with muco-pululent discharge from the nostrils. Labored breathing, the standing position, pumping of the abdomen, sunken eyes, staring coat, cold extremities, loss of appetite. In long drawn out cases pleuritic adhesions and in some instances empyemia. During the course of the disease the temperature remains high. In this form of pneumonia the bipolar organism of hemorrhagic septicemia is frequently found along with others. The mortality is quite high and animals which do recover are often affected with pleuritic and pneumonic lesions which permanently affect their health. Calf pneumonia is apparently more highly contagious than scours and will affect older members of the calf herd as well.

A post-mortem examination of a calf dead from scours reveals an emaciated carcass, anemia, an inflamed gastric mucosa with edema. The pylorus containing considerable amounts of glary mucous. Punctiform and linear hemorrhages are seen. The small intestines are inflamed and contain fetid, yellowish-gray or reddened material together with a great quantity of gas. The mesenteric lymph glands are swollen, edematous and sometimes dotted with petechial hemorrhages. Other viscera are pale and the structural tissues dehydrated. In pneumonia the lungs are found in varying stages of inflammatory reactions depending on the extent of the disease. In some necrotic foci are seen in the diseased area, pleuritic effusions, and later adhesions. Pericardial effusions also take place with petechia on the heart, the serous membranes and in the lymph glands.

The diagnosis of these conditions is relatively easy. The symptoms are marked, characteristic and quite obvious. One should be careful in prognosis, however, for in many outbreaks the mortality is high and treatment is not attended with a great deal of success. Even the control of the disease on some farms is difficult, particularly when facilities for proper isolation and sanitation are wanting.

In outlining measures which may be taken to prevent, control and treat these conditions it is felt advisable to deal with them in that order. To successfully establish prevention a veterinarian should have control of the herd and as far as possible have a complete knowledge of the etiological factors both contributary and actual. One of the first items to be given consideration is the mating of sexually sound parents. No cow having an abnormal genital discharge should be bred. Conception with an infected uterus is possible and may ultimately interfere with the development of a sound and healthy calf. If there are any indications that the sire is not normal care should be taken in this respect also. During pregnancy a suitable diet should be provided at all times and the cow if milking should be dried off about eight weeks before parturition. Iodized salt should be available. Make sure that there is no mineral deficiency. Definite rules regarding the cleanliness of the cows and the

stable quarters should be maintained. White washing and sprinkling of slaked lime on the floors helps toward cleanliness. Prepare the cow for calving by washing her hind quarters and external genitals and placing her in a clean maternity stall. At the conclusion of parturition again have the stall cleaned. Whether the calf is permitted to suck its mother or fed by hand it should be given the colostrum from its own dam providing her udder is normal. On farms where the disease has existed a prophylactic dose of White Scours serum should be administered as soon after birth as possible. A common error in the feeding of newly born calves is to feed them too much at one time with long periods between feedings. This is a mistake. Naturally the newborn animal feeds often and only partakes of a small amount. This feature should be given due consideration in hand fed calves. Keep the calf in warm, comfortable quarters until it has become vitally rugged. See that the meconium is passed. Do not allow it to become chilled or exposed to draughts. Where it is possible to have it done a temperature chart may be kept to record the temperature of the calves twice a day for the first week or ten days of their lives. Any rise in temperature should be regarded with suspicion. At once isolate that calf. Administer curative doses of scours serum, cut down on the milk diet and give teaspoonful doses of sodium bicarbonate in barley water or lime water. The foregoing constitute preventative measures and they have for their object the development of a strong, healthy calf in clean, sanitary surroundings. There are those who advocate the use of biologics on the pregnant mother with various forms of bacterins for the purpose of stimulating the production of antibodies in the body of the dam. These are of questionable value for it is not believed that these protective powers are conveyed to the body of the developing fetus. They may, however, lessen the virulency of any latent infection.

In handling an outbreak of scours isolation of affected animals should be practised. They should be cared for by a separate attendant if possible or at least after the well ones have been looked after. Separate feeding utensils should be provided for them. Warm quarters and cleanliness are essential. Administer prophylactic doses of scours serum to the well calves. Treatment of sick cases consists of eliminating milk as an article of diet. Provide barley water or lime water to which a little white flour has been added. A pint of either of these at body heat three or four times a day with a teaspoonful of sodium bicarbonate added. Dram doses of aromatic spirits of ammonia to stimulate as required. Strong calves may be given castor oil at first. Weak ones may require feeding with syringe or stomach tube. Other agents recommended and used are prepared chalk, bismuth subnitrate, tincture of opium, peppermint water, and intestinal antiseptics. Curative doses of white scours serum every 3 to 6 hours until the temperature becomes normal are of value but expensive. Valuable calves should have the limbs bandaged and the surface of the body kept warm in the colder seasons of the year. As soon as the scours cease the calf may be gradually brought back to the milk diet and it is advisable to administer a digestive ferment such as pepsin or taka-diastase along with tincture of gentian compound to assist the gastro-enteric functions.

In calf pneumonia the hygienic and sanitary regulations advised for scours are applicable. Where the disease exists and is known to recur inoculations with autogenous bacterins to newlyborn calves is of value as a means of prevention. Practitioners know the treatment of pneumonia. It should be remembered however in pneumonic cases associated with digestive disturbance treatment will be greatly enhanced by correcting the digestive trouble as early as possible and by changing to barley water using digestive ferments and tonics much may be accomplished in this respect.

Anesthesia and Restraint of the Ox

By E. R. FRANK, Manhattan, Kansas

Division of Veterinary Medicine, Kansas State Agricultural College

GOOD anesthesia is absolutely essential for the best surgery and is practiced to the greatest extent by the skillful surgeon. Clients are more appreciative of the practitioner who is able to perform both minor and major operations upon animals without evidence of pain on the part of the patient. This is especially true of the owner of the individual animal who thinks almost as much of it as he does of a member of his family. With such a variety of efficient methods at our disposal, there is very little excuse for performing a surgical operation without anesthesia.

Local Anesthesia

For use in the performance of minor operations there are many local anesthetics available, which are practically nontoxic, reliable in action and do not require a narcotic license for their use. Among the products with which we have had experience are procain, butyn, dulcin, apothesin, and locadyn. These can be relied upon to produce the desired results.

The addition of ten to fifteen drops of a 1-1,000 solution of adrenalin chlorid to each one hundred cubic centimeters of the anesthetic solution is of great assistance in performing surgical operations. Adrenalin not only delays the absorption of the solution thus prolonging its action but also tends to diminish capillary hemorrhage in the operative area.

The skin, in many operations, is the most sensitive structure we invade and it is important that this tissue be anesthetized. The skin injection is best made intra-cutaneously. Using a 0.5% solution, first make an insensitive wheal by injecting a few drops of the solution into the skin. Hold the needle parallel to the surface of the skin. A little pressure on the plunger of the syringe separates the layers of the skin and produces an elevation on its surface. The point of the needle follows the solution and its insertion is thereby rendered painless. Where a comparatively large surface will be involved in the operation it is preferable to encircle the area rather than injecting along the line of incision.

Rumenotomy may be performed painlessly by making an intra-cutaneous injection with a 1% solution along the line of incision and then infiltrating the underlying tissues layer by layer down to and including the parietal peritoneum.

In handling minor teat operations, infiltrating the skin and subcutaneous tissue around the operative field is sufficient and for more extensive operations the entire structure may be blocked off by a thorough injection around the base. A few cubic centimeters of 2% solution injected directly into the milk canal renders the mucus membrane insensible in a few moments.

Surface anesthesia of mucous membrane is readily produced by a 2% solution. Butyn is probably the most efficient for this purpose.

In removing the eye, the lids and conjunctive are blocked in the usual manner and the tissues surrounding the orbit infiltrated by a deep injection.

Regional Anesthesia

Regional anesthesia of the posterior portions of the animal is unquestionably most efficiently produced by the epidural injection introduced into this country a few years ago by Prof. Franz Benesch of Austria. The majority of operations require from 20cc. to 40cc. of a 0.75% solution, both the strength and quantity are governed by the degree of anesthesia desired and the size of the animal. The site of injection is located by elevating the tail and feeling the very evident depression between the first and second coccy-

geal vertebrae. A 16-gauge, two-inch needle is inserted, into the center of the depression, until the point strikes the bony floor of the canal. When the needle is properly placed practically no force is required in making the injection and for this reason a glass syringe, which has a minimum of internal friction, is preferred. A few cubic centimeters of solution will cause the tail to become limp and insensitive in a short time. This is a ready means of testing the accuracy of the needle location. This method of anesthesia is indicated in replacing prolapse of the rectum, uterus or vagina, removal of some retained placenta, and other operations or manipulations of the genitalia.

Epidural anthesia is probably more universally used than any other and is especially valuable in controlling straining while the operator adjusts some malpresentation of the fetus in cases of difficult parturition. The retractor penis muscle of the bull readily relaxes under the influence of an epidural injection allowing the penis to be exposed, for examination or operation without the difficulty usually encountered. In operations on the extremities of the limb, amputation of the udder and other painful operations it is necessary to use a 2% solution in order to produce the desired degree of anesthesia.

Hypnosis and General Anesthesia

To quiet an animal or as a sedative for long operations, chloral hydrate may be used. Chloral hypnosis is produced by dissolving two to four ounces of the crystals in a gallon of warm water and giving the solution per os by means of a stomach tube. The dosage will depend on the size of the animal and the degree of hypnosis desired. A few inhalations of chloroform may be necessary to complete the anesthesia.

Chloroform stands out as the foremost agent for producing general anesthesia with complete relaxation of the muscles and is a safe procedure in the ox when properly administrated. It is of utmost importance that chloroform should be chemically pure and that it be protected from sunlight.

The open method of administering chloroform is usually preferable to any other. The animal is confined in the desired position and the upper nostril well lubricated with vaseline to prevent irritation of the mucous membrane. The nostril is covered with two or three layers of gauze and the chloroform dropped on the gauze at such intervals as the patient indicates a growing tolerance for it. By this method the animal becomes accustomed to the chloroform fumes, irritation of the sensory nerve ending in the respiratory mucosa is reduced to the minimum and thereby excitement and struggling are practically eliminated. The patient is now accustomed to the chloroform. The lower nostril is plugged, the mouth held shut, the gauze increased to four to six thicknesses and the quantity of chloroform increased until several drops are used at each inspiration. After carefully leading up to the maximum rate of administration is safer and much more satisfactory to push the anesthetic until surgical anesthesia or the stage of maintenance is reached. The amount of chloroform is now reduced to the minimum necessary to maintain surgical anesthesia. The operation should not begin until the patient is completely anesthetized.

ILLINOIS PREPARES FOR COMPLETE TB ERADICATION

At the recent session of the Illinois state legislature a law was enacted requiring all owners of dairies and breeding cattle to submit their cattle for a tuberculin test upon request of the State Department of Agriculture. This law, which provides for indemnity and other essential details in connection with its enforcement, paves the way for making all herds in Illinois free from tuberculosis.

It was not so many years ago that an Illinois legislature passed a law prohibiting cities in the state from requiring the tuberculin testing of cows as a prerequisite to the sale of their milk within those cities.

Bovine Dystocia

By W. M. McLEOD, Manhattan, Kansas

Division of Veterinary Medicine, Kansas State Agricultural College

THE universal fetatome and epidural anesthesia are, without question, the outstanding developments of recent years in the field of obstetrics. Both were introduced to American veterinarians by Prof. Franz Benesch at the 1926 A. V. M. A. clinic in Lexington, Kentucky.

The universal fetatome is an instrument anyone handling dystocia in large animals can well afford to include in his equipment. The chief advantages of this instrument over the ordinary wire saw are: it is well guarded, it cuts rapidly, and due to the unique construction of the guard it will operate in any direction one may wish. With the fetatome one can rapidly and safely complete many operations which were formerly among the most tedious veterinarians were called upon to handle.

The expulsive efforts of the mother constitute the most formidable obstacle in handling the usual dystocia. With these controlled by epidural anesthesia, the time and effort required for a given case is reduced to a minimum. Aside from its practical importance, the use of this form of anesthesia places the handling of dystocia on a humane plane and should enhance a veterinarian's standing in his community. Anesthesia is discussed in another part of this issue to which the reader is referred.

The cow is an admirable laboratory for the practice of obstetrics. The more deliberate expulsive efforts, the character of the placenta which does not early endanger the life of the fetus, and the shorter extremities of the fetus combine to give one a chance for success not enjoyed in other animals. Here, as in other fields, the frequency of success runs a close parallel to the promptness of attendance, but with the cow we enjoy a wider margin of safety than in the other species. Embryotomy, dangerous to some extent for all concerned, is less frequently needed in handling dystocias of the cow.

The Use of Traction

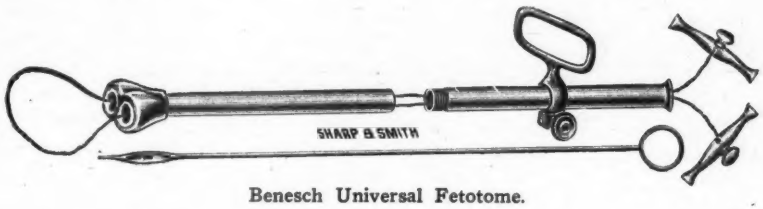
One of the aids used frequently in overcoming dystocia is traction and yet this item probably receives less thought than any other procedure. Traction is the layman's forte, but, in his hands, is rarely little more than brute force. Traction is an aid to the expulsive efforts of the mother and its rational use demands that the fetus have a normal presentation and position and that the extremities are properly extended. Lubrication is a wonderful aid in almost any dystocia, but it is probably most important as an aid to traction. An examination of the abdominal and pelvic cavities reveals that, at the beginning of parturition, the bulk of the fetus lies below the level of the pubis and that the pelvic floor is directed abruptly upward in its posterior part. If one would avoid the natural mechanical obstructions and the possibility of locking the fetal pelvis against that of the mother, the direction of the traction needs some attention. At the start of parturition when the bulk of the fetus is anterior to the maternal pelvis, the line of force should be directed upward and backward. As the shoulders pass the vulva, one should lower the line to the horizontal and finally direct the pull sharply downward and backward. Williams estimates that a force equal to that of four or five men approaches the limit of safety except in cases of uterine inertia or fetal emphysema where the force can be increased to almost double the usual amount.

Mal-position of Fore-legs

Amongst the commonest fetal dystocias are those due to complete retention of

one or both fore limbs. Manual examination reveals the head and neck alone or accompanied by one limb in the birth canal with the missing limb or limbs extending into the uterus below the fetal body. The muscles attaching the limb to the neck and head are taut and repelling the body frequently allows the limb to move toward its natural position until the forearm can be grasped and the complete retention reduced to a flexion at the carpus. Attaching a cord or chain as near the "knee" as possible enables one to exert more traction at the opportune moment and should the attempt fail at first one still has a hold on the limb. The flexion at the carpus is overcome by moving the cord to the pastern, placing the hand under the foot to protect the uterus, repelling the fetus and applying traction. The direction of the pull should be diagonally across the median line of the fetus. This direction of traction carries the carpus toward the flank of the mother and thus avoids jamming the limb against the unyielding vertebrae in such a manner as to leave insufficient room for completing the operation. Where it is necessary or advisable to use embryotomy, the entire limb should be removed. This reduces the bulk of the fetus and does not leave a stump of limb which would be difficult to secure and direct in the proper position. To remove the limb when it is completely retained, isolate the upper half of the scapula, attach a cord or chain about the narrower part of the bone and apply traction. In this case a series of sharp jerks are preferable to steady traction. The limb is pulled out of the skin much as the finger is pulled out of a tight glove. The skin may be divided at any convenient point after the limb is free from the body.

Another deviation of the forelimbs which is particularly baffling to the layman is flexion at the elbow. Since the feet and nose appear at the vulva in apparently their normal relation the novice sees no reason why traction should not be successful. The point is that the nose and feet are equally advanced whereas in the normal extension of the limbs the feet are more advanced than the nose. To correct this repel the fetus and at the same time put strong traction on the limb.



Benesch Universal Fetotome.

Dystocia Due to Head at One Side

Deviations of the head and neck causing dystocia are of two varieties. First a slight lateral deviation which allows the nose to strike lateral to the shaft of the ilium. Usually this condition can be corrected by placing the hand lateral to the head and crowding this organ into its natural position. Occasionally it is necessary to use considerable traction in order to replace the head. The logical hold for traction on the head is by means of a halter or war bridle as this method keeps the nose in the proper direction. A hook placed between the rami of the mandible may be advocated but has an insecure hold and it is embarassing to find the calf alive after such a procedure.

The second deviation of the head and neck, fortunately, is not common. It consists of a complete lateral bending of the neck so that the head rests alongside of the body. The deviation apparently develops late in the gestation period for we rarely find evidence of torticollis. The head is usually in such a position that

it is difficult to get a firm hold on the nose which is just the point where we gain the greatest leverage. Some form of a halter is desirable. A loop of cord over the poll and into the mouth give the necessary hold. This may be either a simple slip noose or a doubled cord, the ends of which are knotted and twisted until the loop is tight about the head. Now that we have a firm hold on the head, repel the body and apply traction to the head. The simplest form of embryotomy for this condition is amputation through the neck as close to the body as possible. The fetatome is admirable for this purpose providing one can pass the saw around the neck. Removing the soft portions both above and below the vertebrae will reduce the size of the neck to such an extent that the saw may be readily placed in position.

Posterior Presentation

While posterior presentations are not as common as the anterior they are possibly complicated by a relatively greater number of dystocias than in the former. The position of the fetus with its hind limbs under the body favors the development of deviations of the limbs.

Flexion of the limbs at the hock is the simpler of the two deviations of the hind limbs. This condition can usually be corrected by repelling the fetus and exerting traction on the foot. As in the case of correcting deviations of the forelimbs, it is advisable to guard the uterus by placing the hand beneath the foot. If embryotomy is necessary, the limb is in a favorable position for the use of either the fetatome or chisel.

Complete retention of the hind limbs, often known as "breach presentation" is one of the more difficult dystocias to handle. When this type of dystocia is of recent origin, and one uses anesthesia, the fetus can be repelled and the limb extended by first converting the complete retention into a flexion at the hock and then completing the extension from this position. Embryotomy is frequently necessary and the instrument of choice is the fetatome. Rotating the fetus into a dorso-illiac position gives one a surprising advantage in placing the saw. With the saw around the limb as close to the body as possible, place the head of the guard above the hip joint close to the vertebral column. With the saw in this position the limb will be removed at or very close to the hip joint and the bulk of the buttocks is reduced until the pelvis readily passes through the birth canal.

Caesarean Section by Dr. W. P. Bossenberger, Williams, Ia., in a case of schistocormus reflexus.

Some Surgical Operations of the Foot and Digital Region

By R. R. DYKSTRA, Manhattan, Kansas

Dean, Veterinary Division, Kansas State Agricultural College

IN THE clinic of the Kansas State Agricultural College by far the commonest foot operations are those resulting from foot-rot.

These foot-rot infections are very common during the winter months when the animal is compelled to walk in wet, slushy lots so that the skin between the claws and around the coronet becomes macerated and softened. When the ground freezes over and the animal is compelled to walk on this rough ground, the devitalized skin breaks open and infection usually of the necrosis variety gains entrance.

When there are extensive outbreaks we have found the best preventive measures in carrying out certain sanitary requirements. Yards or lots should be well drained and disinfected with a 1% solution of copper sulphate or other reliable disinfectant.

As an additional precaution, where a good many of these cases occur in a herd, it is a good plan to compel all the animals to walk through a shallow foot bath consisting of a 0.5% solution of copper sulphate. These shallow baths may be placed in a gate-way between two lots and the animals driven from one lot to the other, compelling them to walk through the copper sulphate foot-bath.

Instead of using a solution of copper sulphate, especially in the winter months when such a solution is likely to freeze, we have observed fairly good results from compelling the animals to walk through ordinary air slaked lime.

The disease as it manifests itself in its early stages is beyond the scope of this article. In the later stages where the disease has been permitted to advance without proper treatment, it is not uncommon for the animals foot—at least one-half of it—that is an outer or an inner claw to be very badly infected. The infection has resulted in an enlarged region about the coronet with one or more fistulous tracts and evident envolvement of the corono-pedal articulation. In extreme cases all of the tissue from the lower border of the foot up to the fetlock joint may be invaded. Fortunately, in most cases it is only an inner or outer digital region that is involved.

In the handling of an infected coronopedal articulation for many years we resorted to the classical operation for exarticulation as described in standard text books on surgery. This was an arduous operation, and when Frost of Cornell told us of a simpler and more practical operation we attempted it, and are now using it exclusively.

The animal should be placed in lateral recumbancy with the affected claw uppermost. We operate under local anesthesia by the infiltration method. We did not find nerve blocking of this region satisfactory. If the local anesthetic solution is injected all around the coronet and even into the articulation itself it will be found to produce a satisfactory degree of anesthesia.

A tourniquet should be placed around the leg at some point above the operative area in order to control the hemorrhage. Needless to state, the entire operative area should be rendered as clean as possible.

If an imaginary line is drawn from the coronet in the region of the toe extending downward and backward on the lateral surface of the claw so that it reaches the plantar border at a point where the posterior third of this border meets the

middle third then it will be found that this line is almost superimposed over and follows the general direction of the corono-pedal articulation.

The operation then consists in sawing through the tissues—with a surgeon's saw—directly over the imaginary line. By this means an almost complete corono-pedal exarticulation will be effected. We are particular about using a nickel plated surgeon's saw because the use of an ordinary hand saw in our opinion places the operation in the empirical group, and might even tempt the owner of the animal to attempt the operation himself at a future period. A small piece of pedal bone is not removed by this operation and it must be taken out with a chisel. The next step consists in removing all diseased tissue and any cartilage of incrustation by means of a currette.

After treatment consists in placing an antiseptic pack around the wound to be maintained in position with a bandage. If the animal does not appear to be inconvenienced a satisfactory bandage may be left in position for as long as a week and then is to be replaced with a clean one.

In more severe cases instead of an exarticulation at the corono-pedal articulation we perform an amputation through the middle of the first phalanx. The preliminary steps for this operation are the same as for the exarticulation.

The medial and lateral claws are separated from each other as high up as necessary by means of a single incision. The diseased claw is then removed as in any other amputation, that is, resorting to the flap method. Extreme care must be taken to utilize every particle of available soft tissue to form a satisfactory pad over the end of the divided first phalanx.

The after treatment of this condition is similar to that of an exarticulation.

It has been our experience that cattle with a badly infected digital region do much better after an exarticulation or after an amputation as described in this article than where one attempts to effect healing without resorting to these procedures.

SNUFFLES IN RABBITS

A client had 150 pure-bred rabbits. Due to rather crowded housing snuffles broke out, and over 25 died before treatment was instituted.

We gave all the survivors 1cc. hemorrhagic septicemia bacterin; a small amount sweetened mucoseptone in the drinking water; had them put in clean,

A rabbit with snuffles. This one weighed 15 pounds.

disinfected pens; fed plenty alfalfa, dandelion greens, and whole oats.

There were about thirty sick. Of these, three or four died, and the remainder recovered. To the most severely affected we gave a very small dosage of potassium dichromate. We have used copper sulphate also with fair results.

Just exactly what snuffles in rabbits is we have never been told, but it seems to be a second cousin of influenza or distemper, and poor hygienic surroundings bring on the complications which cause a lot of funerals.

Moscow, Idaho. E. T. Baker.

Surgery of the Eye of Cattle

By H. E. BEMIS, Philadelphia, Pennsylvania

THE eye of the ox is apparently not so often affected with surgical conditions as the eye of the horse and dog. Wounds of the lids and cornea are not so frequent, and the thickness of the skin and stiffness of the tarsal cartilages make entropion and ectropion less apt to occur. On the other hand when it does become necessary to examine or operate upon the eye or lids of the ox the problem of fixation of both the animal and the eye are the most difficult of any of the species. The eye seems to be extremely sensitive and the lids, nictitans, and orbit are difficult to fix. In preparation for any operation which requires delicate and accurate technic, therefore, the animal should be given a drench of warm chloral hydrate solution (½ to 2 ounces according to size) previous to the operation and then cast and the tissues thoroughly injected with a local anaesthetic before proceeding. For disinfecting the surfaces use 2% to 4% solutions of boric acid.

Pterygium

I mention this condition, not because it is frequent and therefore important, but because of its infrequence it is so little understood when it does occur. Cattle seem to be more prone to various congenital structural irregularities than other species, and pterygium is one of these. It consists of a fan shaped extension of skin, sometimes containing hair, which extends over the cornea from the inner canthus toward the center or entirely across the cornea. If the process is not raised enough from the cornea so that it can be dissected off, its growth may be stopped by cauterizing its base with phenol. Dip a glass rod in pure phenol and shake off the excess, then draw the tip of the rod across the base of the growth. Repeat this procedure from time to time depending upon results obtained.

If there is enough substance to the process that it can be grasped in forceps, fix it and with a very sharp knife (Bard-Parker) shave the process off the cornea, being careful not to puncture the cornea. Apply a boric acid pack until granulation is well under way.

Wounds

There is probably little need for discussing wounds of the lids. They are not so often torn as in dogs or horses and as a rule a slight defect in the lid due to loss of substance is not so important as in the other species. It is remarkable how well wounds of the eyelids will unite when carefully adapted by sutures. *For this purpose always carry a few scaled tubes of fine silk with half curved needle threaded ready for use.* Use interrupted sutures and pull them just tight enough for easy apposition and not so tight as to cut and irritate. The animal is less apt to rub them out. Apply a collodion dressing over the line of suture to exclude infection and lessen the movement.

Wounds which penetrate the cornea and allow escape of the aqueous humor or prolapse of the iris sometimes occur. Do not be too hasty in concluding that the eye must be taken out in such cases. If the iris is not prolapsed, instill a few drops of atropin (1%) in the eye to dilate the pupil and thus draw the iris out of the wound. Then apply a boric acid pack to exclude infection and light. Change the pack once daily. The corneal wound will heal quickly and the aqueous humor be replaced if infection of the cavity has not taken place.

A recently prolapsed iris appears as a black mass protruding from the wound. If it has been prolapsed a few days, it begins to granulate and then appears as a strawberry-like tumor mass protruding beyond the surface of the cornea. The black color may be covered up by granu-

lations, but will be seen on cross-section when the mass is cut away. The recently prolapsed iris may be replaced with forceps and then treated as stated above. If it has become caught in the healing process and has resulted in a granulation tumor, control the animal, retract the lids, fix the eye with tissue forceps and shave off the mass on a level with the cornea. If the iris is not adherent, and the corneal wound heals without infection, the animal will have a corneal scar and an irregular pupil but be left with fair vision. If the iris is adherent there will be no sight but the eye will be saved. If a suppurative panophthalmitis results from such wounds the eye must be excised.

Tumors

Tumors of the eye are quite common. They are usually either sarcomas or carcinomas, both of which are malignant. Clinically there is little need for differentiating between the two. Malignancy is indicated when the tumor mass is soft, granular, bleeds easily, invades surrounding tissue, grows rapidly, spreads by metastasis, breaks down and gives rise to pus formation or bad odor. Therefore, the history and the clinical symptoms should give the operator a good index as to the kind of tumor and the degree of malignancy. These factors have an important bearing upon the prognosis and the kind of operation to be used. If the degree of malignancy is low, the tumor may be excised with good results, if the degree of malignancy is high, the entire structure involved must be excised to at least a safe distance beyond the tumor.

Many tumors of the eye involve the nictitans membrane. If taken in time, it is a simple matter to expose the nictitans beyond the point of involvement, and cut it across with scissors. If the tumor has involved the conjunctive of the lids or cornea, is not too malignant, and all parts of it can be exposed, excision of the tumor by careful dissection in healthy tissue beyond the limits of the tumor tissue is indicated. If the tumor extends behind the orbit or involves the orbit itself, then the orbit must be removed as well as all other affected tissue.

Extirpation of the Eye

In case of suppurative panophthalmitis and tumors involving the orbit or situated posterior to the orbit, extirpation is indicated and the one operation par excellence is the following:

To perform the operation, confine the animal on the table or ground and carefully remove the hair by shaving the lids and surrounding area and paint the surface with tincture of iodin. With a small hypodermic needle, inject subcutaneously and intradermally a liberal amount of local anesthetic, such as a 2% solution

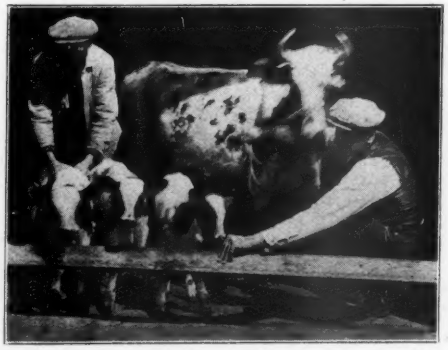
Zebus of Brazil—the one in the center is a bull, on the right a cow.

of stovain, apothesin, or procain, containing adrenain chlorid in a 1 to 5,000 solution, into the upper and lower lids, about one centimeter from the border of the lids. Follow this by injecting about 2cc. of the same solution into each of four different points into the depths of the region posterior to the orbit.

Suture the upper and lower lids together with a continuous silk suture, fix the skin of the lids with tissue forceps and, with a very sharp knife, make an incision through each lid about one-fourth inch from the borders uniting the incisions the same distance beyond the lateral and medial canth. The incision should pass to but not through the conjunctiva. The hemorrhage should at all times be carefully controlled so that this technic may be carried out after completing the incisions to a uniform depth throughout their extent. The conjunctiva is separated from the lids back to its attachment to the orbit. This leaves the conjunctiva attached to the border of the lids which have been sutured together and these tissues may then be used to apply attraction upon the orbit. After the dissection has been carried back to the point of insertion of the conjunctiva to the orbit, the muscles of the eye are clipped with a pair of curved scissors and finally the optic nerve is cut in the same manner and the orbit completely removed the third eye lid being removed, with it. All of the periorbital fat should be left in place. The hemorrhage which is not great should be controlled with sterile gauze sponges and all blood clots removed from the cavity. The cavity is then packed with sterile gauze dusted with equal parts of chlorinated lime and boric acid well mixed together, or iodoform, and the cut edges of the lids carefully sutured with interrupted silk sutures from the external angle, omitting the last stitches to provide drainage. Remove the pack in twenty-four hours and inject into the cavity about one-half ounce of Bipp, which is a paste composed of iodoform, bismuth subnitrate and liquid paraffin in the following proportions:

Iodoform, 16 oz.; bismuth subnitrate, 8 oz.; liquid paraffin, 8 oz.

Very little after treatment will be found necessary. The cavity will fill and the edges of the lids become permanently healed together in about two weeks. The area is finally left somewhat sunken but the surface is absolutely smooth and no discharging wound remains.



Triplets delivered by Dr. O. W. Biersdorf, Milford, Mass. This cow produceed one calf at her first calving, Twins at her second and Triplets at the third calving.

NEVER EAT RAW PORK

Cook pork well! To eat raw pork is dangerous owing to the risk of contracting trichinosis.

Trichinosis causes serious illness and sometimes death. Thorough cooking will kill these parasites that cause it and make them harmless. No dependable treatment is known for the disease.

This warning is frequently given by the U. S. Department of Agriculture and is now repeated by Dr. Benjamin Schwartz in Leaflet No. 34-L, Trichinosis; A Disease Caused by Eating Raw Pork, just published for free distribution by the Department.

Teat Obstructions and Hard Milkers

By H. E. BEMIS, Philadelphia, Pennsylvania

THE walls of the teats are composed of an outer thin and hairless skin, a supporting structure of connective tissue, a very vascular submucosa and a ductless mucosa covered with stratified squamous epithelium. A sphincter of smooth muscle guards the narrow orifice at the end of the teat. Above the sphincter the canal is wide and communicates freely at the base with the sinus or cistern. The width or diameter of this communication can be determined by indenting the base of the teat with the index finger and examining the size of the opening into the sinus. It is a good routine practice in case of teat obstructions to thus examine all four teats, because it gives some indication of the extent of the process in the affected teat and throws light upon the prognosis. I think in many cases the tumor or membrane which may be the immediate cause of obstruction is only a part of a more general congenital or inflammatory process. Rubeli of Berne, Switzerland, states that many teat obstructions, especially those near the base are congenital in origin, while some are undoubtedly the result of chronic inflammatory processes. A congenital obstruction is apt to be more local and circumscribed while inflammatory obstructions, even though there may be one definite obstruction at some point are usually accompanied by general thickening of the surrounding structures. This has a bearing upon the prognosis.

The most common teat obstructions are:

1. Membranous obstructions across the base of the teat.
2. Tumor like masses within the canal located anywhere from the base downward.
3. Congenital atresia of the skin orifice or of the orifice and varying lengths of the duct.
4. Structure of the orifice following infections, contusions and cuts.
5. Congenital stricture or hard milkers.

Space will not permit a discussion of all the methods recommended for these various obstructions. I think all are agreed that the nearer the base of the teat the process is located and the more general its nature the less favorable is the prognosis.

Membranous Obstructions

For the membranous obstructions some form of tearing or rupture seems better than cutting. The tissues at the base of the teat are very vascular. Cutting is followed by more hemorrhage and more liability of recurrence than tearing. Tearing is accomplished by introducing a rigid instrument with a fairly sharp point but with no cutting edge. First puncture the membrane near the center and then tear it in as many directions as possible from center to side walls. Advise frequent milking, as long as there is any evidence of hemorrhage, but leave the teat full of milk to prevent the edges of the membrane from reuniting.

I have had no personal experience with the rubber covered, curved udder clamp brought out by Jensen Salsbury Laboratories for rupturing the membrane, but the principle looks good. Someone ought to write of his experiences with this instrument and with Trump's teat tumor remover made by Norden Laboratories.

Tumor-Like Obstructions

The fibrous tumor-like obstructions located along the side walls of the canal offer serious difficulties, especially when located near the base of the teat. Of the many procedures recommended for the removal of these tumors, I prefer the one used by Case, which consists in introducing a teat bistoury and slicing the

mass in many pieces without attempting definite removal. If the tumor is firm and well circumscribed it may be snared out with Hug's teat tumor extractor or dissected out, working through the end of the teat with the Lothe forceps and knives. To facilitate working, the end of the teat may be split if necessary, but I do not advise cutting down through the side wall for direct removal of the tumor on account of the danger of forming a milk fistula.

Following any of these methods, the resulting hemorrhage is a serious problem in the after treatment. The teat should be frequently milked to remove the blood before it clots. Patience and gentleness are of prime importance in milking. Small clots which cannot be milked out directly will usually yield to a little manipulation and allow milking without further injury or resorting to a milking tube. Always leave some milk in the teat.

Atresia of Milk Duct

Obstructions at the end of the teat can usually be successfully relieved if they are confined to the end. If there is an atresia extending any distance up the canal it had best be let alone and the quarter dried. For obstructions at the end of the teat, there are a number of methods recommended which involve either cutting or dilating the sphincter. The most practical method I know of which can be used on all forms of obstruction whether acute or chronic, congenital or inflammatory is the use of Stoll's teat slitter. It is a pear shaped double edged knife mounted on a rigid stock. A small blunt spike precedes the knife into the teat orifice and acts as a guide. The instrument is made in three sizes; the middle size is the most used.

With the cow in the standing position and the end of the teat well prepared, the teat is pulled down and compressed between the thumb and index finger of one hand. The spike is inserted into the orifice and with a quick jab the end of the teat is cut in two directions. There is very little pain or hemorrhage. The teat should be milked a little every hour or two during the day for one or two days. The stream of milk will spray a little for two or three weeks and then return to a round stream and easy milking.

Last year, I searched all over Europe for new instruments and methods for teat operations but found none that seemed superior or different from our own.

Infection of the Quarter

Sometimes one quarter becomes incurably infected and the owner wishes to dry off the one quarter while the others continue milking. The following suggestion from Prof. Stalfors clinic at Stockholm may prove of interest to some for this purpose: Thoroughly empty the quarters and inject into it 300 c.c. of a 1-1,000 solution of silver nitrate. Four days later milk out the quarter once and then cease treatment. It is claimed that quarters so treated may return to milking at the next lactation period.

STUBBORN IMPACTION

After being treated for six days, the patient shown in the illustration, a twelve-year-old mare, died.

Autopsy revealed a solidly packed "clog" of the small colon, 56 inches in length, and weighing over 100 pounds.

Impacted mass 56 inches long in the colon of a horse.

To have moved this obstruction at least one-half stick of dynamite would have been necessary.

Moscow, Idaho. E. T. Baker.

Ablation of the Quarters and of the Whole Udder

By H. E. BEMIS, Philadelphia, Pennsylvania

THE anatomical features which are of the greatest importance in connection with amputation of quarters or halves of the udder are first, its incomplete division into quarters and its complete division into halves; second, its suspension by a paired ligament on the median line which is derived from the abdominal tunic and a lateral ligament which covers the gland and its vessels over the lateral surfaces; third, its great vascularity, supplied chiefly through the external pudic artery coming through the inguinal canal and drained by the accompanying external pudic vein, but also by the perineal vein running backward and upward from the base of the udder and the subcutaneous abdominal or milk vein running forward from the base of the udder; fourth, its great sensibility.

Amputation of halves or quarters is chiefly indicated in cows for the removal of centers of infection (gangrenous mastitis) which if not removed might either greatly delay healing or result in septicemia and death. Tumors, actinomycosis and botryomycosis of the udder are rare in cows. On the whole, amputation of more than an already partially necrotic quarter is seldom called for. I know one veterinarian who used to amputate many udders and thought he saved many lives. It is the right thing to do, especially in beef cows if the progress of the infection indicates that death will probably occur unless the source of infection is removed.

One quarter cannot be separated from its mate unless a line of demarkation has already been established by the necrotic process. The advantage of operating in such cases is that the knife immediately takes away tissue which would otherwise require several weeks to slough. The operation requires little technic other than to keep just outside of the line of demarkation with the dissection. There will be little pain and little hemorrhage. The wound is left open for free drainage and kept dry with dusting powders or astringent applications.

To amputate a half or the whole udder, cast the animal on her side, draw the upper hind leg out of the way, shave and paint with tincture of iodin over the line of incision. Use chloroform, general anaesthesia or lumbo-sacral puncture, the technic for which is as follows:

Inject 15cc of a 3% solution of procain at the bottom of the spinal canal, from a point 2 c.m. or ¾ of an inch posterior to a line drawn between the external angles of the ilia. Puncture the skin and supraspinous ligament with a large needle, then pass a 20 gauge needle 3 to 4 inches long through the first needle or through the puncture made by the first needle.

Make a skin incision from the base of the udder downward toward the posterior teat, then forward past the anterior teat and upward to the subcutaneous vein. Dissect the skin flap from the lateral fascia and reflect it to expose the inguinal region. Cut through the lateral fascia in the inguinal region and identify the inguinal vessels by palpation of the artery. Gather the whole bundle in the fingers and tie them off with very strong cord in two places and then cut the vessels between the cords. Search for the perineal vein and tie it off. Cut the lateral fascia along the base of the udder and separate the areolar tissue which lies between the udder and the abdominal tunic, with the hand. Find and tie off the subcutaneous vein in two places and cut it. Next cut the suspensory ligament belonging to this half of the udder, and partly by blunt dissection,

partly with the knife separate the two halves along the median line. Cut the skin between the two halves of the udder and the one half drops away. If the other half is to be amputated, turn the animal over and proceed as before. Tie off any important bleeding vessels, quilt the skin down to the remaining base as well as possible and apply a pressure body bandage of sheeting or muslin.

Carry out ordinary wound treatment. Some of the skin flap may slough and the wound must then heal as an open wound.

THE SPREAD OF UNDULANT FEVER

Undulant fever is becoming more frequent in France. Since 1920, it is estimated that 10,000 people in southern France alone have had the disease. It is now found in fifteen provinces, while fifteen years ago it was limited to the Mediterranean coast. It causes relatively few deaths, but the number seems to be increasing. Thirteen deaths occurred in one region of the Alps last year. The disease spreads especially among the country people who live in contact with cattle and who milk goats and sheep and handle dung. Sheep seem to be more dangerous than goats; eighty per cent. of the cases observed in Languedoc and Province are due to sheep. Goats and sheep recover rather quickly; the disease in them is principally manifested by abortion. Animals that recover remain germ carriers for a long time and thus are a source of infection for the peasants who look after them. Infection from cheese occurs only in the city and is rather rare because it is a definite source only when eaten fresh. Tests which reveal the infection in human beings do not give convincing results in goats and sheep. Thus it cannot be relied on to distinguish between the healthy animals and the germ carriers in a herd of cattle. The question of prophylaxis is complicated because of the similarity between *Bacterium melitensis* and *Bacillus abortus,* which is found in cases of abortion in cattle and hogs in Italy, Belgium, Denmark, Poland, Africa and the United States. In France, only a few cases of undulant fever of bovine origin have been recognized so far, in the provinces of Loiret, Doubs and Bouches-du-Rhône. In a recent paper Professor Lisbonne reported the prophylaxis to be used in this disease. After having stated the inefficiency of all means applied, he advocated that reports of epidemic abortion in cattle be made compulsory. This would enable disinfection of stables to be carried out, and thus continuous control of the center of infection. The peasants, however, are not in favor of these measures as they disturb their habits and may interfere with the sale of their cattle. That is why Lisbonne proposes that a special law be established to make these reports compulsory. Reports of the disease in cases of human infection are compulsory.—*Jour. A. M. A.,* Vol. 92, No. 7.

Common Farm Transportation in Brazil.

Traumatic Gastritis of Cattle

By JOHN K. BOSSHART, Camden, New York

TRAUMATIC gastritis of cattle has been recognized for a long time. The extent of its occurrence perhaps has been most easily checked up on the killing floors of our large abattoirs.

That cattle should swallow metallic substances such as pieces of wire, nails, tin, forks, open jack knives, etc., is due perhaps to the specific provisions that they will remasticate fibrous roughage such as coarse hay, twigs and leaves after these have been softened or macerated in the rumen. Heavy articles will not be regurgitated for remastication or if they are they will drop to the floor of the reticulum, which compartment contains considerable liquid as is constantly observed when exploring it during the operation for the removal of such foreign objects.

The mucous membranes of the mouth being rather coarse and not sensitive to coarse foods, makes it possible for cattle to simply line up the coarser material into a bolus to swallow it.

During digestive activities in the stomachs, great muscular contractions cause the foreign objects, if more or less pointed, to pierce the walls of the reticulum in any direction, forward, upward, downward, to the rear or either side. For this reason, traumatic gastritis is nearly always complicated with at least a local peritonitis and in addition, either diaphramitis, pericarditis or both, with myocarditis, pleurisy, hepatitis or myositis of the muscles of the forearm, fistula of the brisket, etc.

Occasionally, a true reticulitis exists for some time before any of the complications arise, but more often, especially when the piercing object is of some length, all the damage is done at once.

If the larger blood vessels are pierced, death may occur almost instantaneously from internal hemorrhage rather than from shock, which perhaps does occur, but is rather rare.

Diagnosis

The diagnosis of the various complications can readily be made by careful examination of the patient and observation. Pain is a constant symptom, but varies greatly in intensity, which is principally due to the injury of sensitive parts, such as the diaphragm, pericardium or the pleura or to the reticulum only.

Symptoms

Partial or total loss of appetite, are often the first symptoms noticed, with the emission of groaning sounds, synchronous with respiration. A double expiratory groaning sound is frequently heard where the diaphragm is involved rather high up. In other cases, only one sound is made at expiration. Where the floor of the reticulum is pierced in a downward direction and in nearly all chronic cases, the patients will lay down frequently and groan only in the recumbent position, while in very acute cases and such affecting the heart or diaphragm or pleura, the patients prefer to stand.

The spine is commonly arched in traumatic gastritis; the peak of the arch being just back of the withers, which observation helps to differentiate overloading of the rumen only, or some uterine diseases, or disease of the feet where the peak of the arch of the spine is over the center of the body.

In 50% of the cases operated upon by the writer (I have operated on more than 100 cases) fibrillar twitching of the posterior scapular muscles on the left side have been observed. Sometimes this is noticed also on the right side. Occasionally it is necessary to exercise the animal to bring out these symptoms. The gait is rather stiff and groaning may be present or absent, strong or feeble.

The elbow on the normal animal is always strongly adducted to the thorax on palpating that part, while in gastritis of traumatic origin, simple or complicated, the elbow remains abducted more or less. This

is so perhaps because contraction of the adductor muscles in conjunction with that of others necessary for adduction causes pain in the thorax or about the brisket.

The temperature may be elevated to 104°F., but frequently it is normal, at least in the beginning or then again in chronic cases. The heart beat will be greatly accelerated where the pericardium or the heart muscles are affected, otherwise it may be only 52 to 64. Respiration may be accelerated to 40 or 60 beats per minute where the diaphragm is affected and less so in uncomplicated cases.

The early diagnosis of traumatic gastritis is important for successful treatment by the surgical method, and all other methods must necessarily be expectant principally. In doubtful cases the foreparts of the patient may be elevated by a platform four inches high in front, just back of the stanchion and extending to the rear for three feet to the level of the floor. This position diminishes the pressure upon the injured parts by the rumen with its contents and facilitates some process of healing *per se* or by the formation of adhesions to prevent a general peritonitis that might extend from the point of the puncture.

Operation

The operation for the removal of the foreign bodies is carried out with the patient in the standing position. An area of about six by eight inches is shaved in the left flank below the lumbar vertebrae, in front of the left angle of the ilium and behind the border of the ribs.

A local anesthetic of any choice 1% to 2% in strength is employed and the incision carried down through the skin, muscles and peritoneum to the rumen. The wall of the latter is then sutured to the skin margin with interrupted sutures, or an incision into the rumen is made without this. The margins of the wound of the rumen may then be held apart by the use of forceps.

Doctor Bardwell's method of introducing a rubber sleeve into the opening of the rumen prevents the soiling of the wound with ingesta. This consists of a thin rubber sheet fastened into a metal embroidery hoop. The operator then introduces his right arm into the rumen and feels along the upper wall of the rumen, climbing over the left anterior pillar of the same, to find the inner lining of the cell walled reticulum. The wall of this organ must be thoroughly examined or explored to find the piercing object. Often it is necessary to pull the wall away from the parts to which it adheres by adhesions and releasing it to find the object. All stones and metal objects should be removed as well as the offending article. The rubber sleeve is then removed and the rumen is sutured with two or three rows of a continuous suture. The Cushing suture is preferred by myself.

If the foreign body is a wire which has itself so deeply imbedded that it may be just touched, but cannot be pulled out with the fingers, the wound of the rumen is sutured and after thoroughly disinfecting his arm and rinsing it in a saline solution, the surgeon reaches along the outer wall of the rumen, forward, down along the border

Typical position assumed in advanced cases of traumatic pericarditis. Photo by Dr. M. R. Wilson.

of the spleen, separating the adhesions as he proceeds, until the wire will be found and then he removes it by that route.

The success of the operation is secured by this method only because of the great bactericidal power innate in the peritoneal covering of the organs of the animal.

The peritoneum and the muscles are sutured with No. 2 or No. 3 chromic catgut, and linen is employed to close the skin wound. Every other stitch is removed after five days. The rest of them on the ninth day. Often a drain left at the lower margin of the wound with a piece of gauze or gauze in rubber as a cigaret drain will be of great advantage, especially after the wound has accidentally been soiled. But healing by first intention is usually looked for.

Some patients will bloat within a few minutes after the wall of the rumen has been closed up. To such cases are administered some salicylic acid with ether, one tablespoonful of each to one pint of cider or vinegar, to be repeated every hour for three or four times. The patient is allowed only very easily digested food, such as bran mashes, young grass or fine hay. The owner is advised to feed only small quantities at a time to prevent bloating.

In very large animals it is very important not to make the incision too close to the posterior margin of the ribs as this interferes greatly with the reaching forward to the desired length.

Advanced cases of pericarditis of traumatic origin where a gurgling or splashing sound is heard upon oscultation or where there is already edema in the submaxillary space or perhaps extending way down to the brisket, are practically hopeless. And yet, a few cases are on record for having recovered after resection of a piece of rib over the heart on the left side and draining out the fluid or just the latter by establishing a fistula through the thorax between the ribs or through the sternum as the writer is experimenting with.

For the present, the advice to slaughter the animal upon temporary improvement after the operation for advanced pericarditis seems to be economical.

A DEVELOPMENTAL ERROR IN A COLT

I encountered something peculiar this week, which I believe will prove interesting to some, so I will pass it on before I get too busy and forget it.

I was called one evening to see a sick colt by a Mr. Greer. When I arrived, I found a sucker born some time that morning, in a rather uncomfortable condition, steaming severely and often it would lie down, roll over, get up and back up considerably. I pronounced it retention of the meconium and proceeded to remove it, but to my surprise the rectum was empty.

I then gave a soapy enema without the desired result, even after carefully passing a rubber tube about fourteen inches up the bowel. Before removing the tube, I injected about one ounce of castor oil and gave the colt one and one-half ounces of the oil orally and left the owner an anodyne solution to make things easier for the little fellow. I also gave the owner instructions to apply hot applications on the abdominal region.

I called to see the colt the following morning and found it in very bad condition. In fact, it died about fifteen minutes after I arrived, so I held a postmortem examination which proved interesting to me.

The large bowel appeared to have a piece cut out of it as there was only about two feet attached to the small bowel, with the end completely closed, holding about two quarts of fecal matter and very much inflamed. The other end was small and completely sealed, looked about like a banana in size and shape and attached to the back bowel in its center.

As every veterinarian knows, autopsies like this, do us good.

Aylmer, Ontario, Can. H. J. Davis.

Actinomycosis in the Region of the Head

By H. E. KINGMAN, Ft. Collins, Colorado

IN PRACTICE one encounters actinomycosis in the region of the head more frequently than in any other part of the body.

When the soft tissues alone are involved the prognosis is remarkably favorable.

If the bone is attacked, however, with few exceptions the case is incurable.

In a general way the handling of the case of actinomycosis falls into a routine procedure and consists of

1. The evacuation of all abscesses by surgical means.
2. The removal of granulation tissue and abscess walls through surgery or (preferably) by escharotics.
3. The administration of appropriate doses of potassium iodid.

Etiology

The invasion of the tissues by *Actinomyces bovis.*

Its entrance is probably made possible through a wound of greater or less proportions. For instance, the abrasions made by barley beards and hordeolum awns. So far as I know, this has not been demonstrated by definite experimentation, but the fact remains that in some instances where animals are given access to barley straw, as high as one third of them have developed actinomycosis of varying degrees of intensity and area involved. This has occurred in many localities and is common one year after another.

Symptoms of Actinomycosis of the Tongue

There may be several kinds of lesions of the tongue caused by the actinomyces, such as abscessation and ulceration, but the most commonly recognized form is characterized by the filling of the lymph spaces with fluid and the laying down of connective tissue until the tongue becomes greatly enlarged, very hard and firm throughout. The common term for such a condition is "woody tongue," a very good term.

One of the first signs of "woody tongue" is difficulty experienced in prehension of food. This becomes more and more apparent as time goes on, until it becomes impossible to masticate, or grasp food, or even to drink water.

The stasis of lymph spreads so that the tissues beneath the tongue become edematous, filling the maxillary space with a flabby mass that later becomes organized and hard.

The tongue is increased in size until it spreads out between the sharp molars, subjecting it to lacerations, and extending well out of the mouth, exposing it to injuries of all kinds from sunburn to freezing. Saliva escapes from the mouth and the tongue protrudes from the lips. It is extremely hard to the touch.

Due to the lack of food and water the animal becomes greatly emaciated. If allowed to go without attention it will eventually succumb to starvation.

Treatment

If there be wounds about the tongue, they should be treated with tincture of iodin.

Food and water must be administered through a stomach tube when the animal is unable to eat. During the growing season, green foods may be pushed through the mouth "by hand," oat meal and corn meal gruel being the easiest to give through a tube. This sort of nursing need not extend over a long period of time, since recovery is comparatively rapid (7 to 10 days).

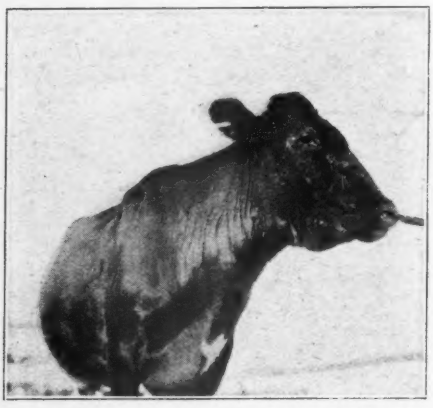
Specific treatment consists of the administration by the mouth of appropriate doses of potassium iodid. The dosage must be large in order to obtain good results. A yearling calf should receive 60 to 90 grains a day for five days, a thousand-pound cow should re-

ceive three drams a day for five days, the dose for bulls in proportion to the weight (about 4 to 6 drams a day), or until signs of iodism, profuse lacrymation, dandruff, rough coat and general depression, appear.

After five days the potassium iodid should be withheld and results observed. The tongue should gradually recede after the fifth day (sometimes immediately after the first dose), and continue to shrink, regaining its normal size, shape and function. If resolution is not complete in from ten to fourteen days, then the five-day course should be repeated until the tissues have returned to normal.

Actinomycotic Infection of the Soft Tissues Characterized by Abscess Formation and Encapsulation

It is well known that certain enzymes or toxins or endotoxins bring about specific types of reaction on the part of the tissues. Actinomyces brings about a highly proliferative kind of reaction accompanied by the formation of thick walls of scar and granulation tissue which incloses or favors the accumulation of large quantities of pus. The physical properties of actinomycotic pus are so certainly recognized that a macroscopic examination reveals its identity without chance of error. It is thick (like cream), shiny, cohesive (not adhesive), rolls over the skin and hair without sticking to the surface, lemon yellow in color, practically without odor (probably tasteless), non-irritant and smooth (like salve).



Typical Actinomycosis of the soft tissues.

Treatment

All abscesses must be opened and evacuated by massage and irrigated with any of the antiseptic solutions that one prefers. A 1% bichlorid solution is very effective, but must be used cautiously. One should make incisions about two inches in length, since this will permit the escape of the contents but is sufficiently small to retain the packing that follows evacuation.

If one chooses, one may introduce a cattle canula through the abscess wall, permitting the escape of pus and the introduction of any agent required to destroy the wall.

Pack the abscess with any escharotic. Formalin (very painful), copper sulphate, tri-chlor-acetic acid, chromic acid, and sometimes a hot iron is used.

Very little dissection is indicated. The abscesses are always in more or less dangerous territory, close to large veins, nerves, arteries and ducts.

One may contend that dissection would be safer than an escharotic over which one has no control. This theory is well founded if the irritant is carelessly used, but if it is carefully packed within the confines of the abscess wall, then there is little danger of damage to vital structures. At least it has been a routine treatment of many successfully handled cases. In some instances an abscess must be packed several times in order to secure complete destruction.

The administration of potassium iodid following operative treatment is a routine measure.

Actinomycosis of the Bone

Actinomycosis of the bone is incurable. I have chiseled away all bone that could be suspected as being diseased and followed the operation with protracted courses of potassium iodid. The cases made what appeared to be a temporary recovery, but finally succumbed to the infection. It is possible, however, that the potassium iodid was not repeated frequently enough.

Pyelonephritis of Cattle

W. L. BOYD, St. Paul, Minnesota
University of Minnesota, Division of Veterinary Medicine

OUR experience would lead us to believe that pyelonephritis accompanied with inflammation of the ureters and bladder is a fairly common disease of cows. The infection is only rarely observed in the male animal. We are of the opinion that the disease is infectious, though mildly so. It is usually chronic in nature but acute cases may occur. The disease in many instances appears shortly after parturition.

Etiology

Pyelonephritis has long been known to European investigators and a number of etiological agents have been described. Höflich[1] in an article published in 1891 described an organism which he isolated from the affected kidneys of a number of animals. He named the organism *Bacillus pyelonephritidis bovum.*

Hutyra and Marek[2] consider pyelonephritis as a disease which may be caused by various bacteria, but call attention to the fact that the "Corynebacillus" is the one most often concerned. Joest[3] discussed pyelonephritis as a specific disease, and points out the fact that the characteristic lesions do not occur in other affections of the urinary organs.

We are of the opinion that the disease is relatively specific and urogenous in origin. We are also of the opinion that the lesions of the bladder are characteristic and occur in most cases. Our studies indicate that vaginitis, placentitis and metritis which are of common occurrence in cows, are not important predisposing factors of pyelonephritis. On the other hand uterine infections which are frequently characterized by retention of the fetal membranes, encourages sepsis and retards involution of the uterus. This condition would seemingly render a very excellent opportunity for the organism of pyelonephritis to gain entrance to the bladder by way of the urethra. We have encountered urocystitis in a number of cases following dystokia in which there was severe damage to the vagina and which we believe was in no way connected with pyelonephritis, but as no bacteriologic examinations were made in these animals, the nature of the infective agent was not determined. As previously stated we are inclined to believe the disease is usually urogenous in origin. We do not deny the possibility that the infection occasionally gains entrance direct to the kidneys by way of the circulation, especially in those cases appearing soon after parturition and associated with infections of the genital tract or mastitis.

Symptoms

The abnormal condition of the urine and the frequency of urination are the first symptoms noted. The urine varies from clear to cloudy in appearance and frequently contains mucus clots. Later the urine is blood-stained and contains small blood clots. After the act of urination is completed the animal continues straining for a short time during which small clots of blood are passed. The color and consistency of these clots indicate the occurrence of recent hemorrhages. These symptoms occur long before there are any signs of inappetance, interference with rumination, decreased lactation or emaciation. Ordinarily the infection is well established before the symptoms become such that they attract the attention of the owner or caretaker. Chemical analysis of the urine shows the presence of albumin and microscopic examinations of the sediment reveals the the presence of erythrocytes, leucocytes,

[1]Höflich, D., Monatsh. prakt. Tierheilk. 1891, B II 337.
[2]Hutyra and Marek, Pathology and Therapeutics of the Diseases of Domestic Animals. Vol. III. 1926.
[3]Joest, E., Spezielle pathologische Anatomy der Haustiere, Berlin, 1924. III.

and diphtheroid bacilli. Rectal palpation of the kidneys, ureters, and bladder intensifies the above described symptoms.

A positive diagnosis can be made by rectal palpation and microscopic and chemical examination of the urine. Rectal examination will aid the operator in determining the extent of the disease particularly when there is marked enlargement of one or both kidneys, and the corresponding ureters. Excessive thickening of the bladder walls may also be recognized by palpation:

Treatment

Medicinal and surgical treatment so far attempted by us has proved unsuccessful. Preventive measures consist of clean stalls for parturient and post parturient animals. Surgical interference consisting of nephrectomy may be resorted to in cases of unilateral infection. The operation should be performed as soon as a positive diagnosis can be made.

The technic for the performance of nephrectomy in the bovine has recently been described by Bemis.[4] In one of our cases we did a nephrectomy which was followed by a short period of improvement when the symptoms recurred and the animal was destroyed. The autopsy showed the remaining kidney extensively involved.

Summary

Pyelonephritis accompanied with inflammation of the ureters and bladder as a result of invasion by bacteria, is a common disease of cows.

The disease which is apparently associated with parturition, may be acute, but is usually chronic, often extending over a period of many months.

Pyelonephritis may co-exist with metritis, but is not dependent upon the presence of infection of the vagina and uterus.

Symptoms of the disease consist mainly in changes of the urine and the frequency in which it is voided. Pregnancy does not markedly influence the course of the disease in chronic cases.

The diagnosis is dependent upon the microscopic demonstration of the characteristic bacilli in the urinary sediment and the presence of albumin and red and white blood corpuscles.

Confirmatory evidence can usually be secured by a physical examination which should never be omitted.

Medicinal treatment is unsuccessful.

Nephrectomy may be performed in cases of unilateral infection and when the disease is in an early stage.

[4]Bemis, H. E., Veterinary Medicine, Vol. XXI. No. 4, April, 1926.

TULAREMIA IN SHEEP

Attention has been called to the wide range of animal life that is subject to infection with *Bacterium tularense*. In view of previous knowledge and the frequency with which domesticated animals are infested with ticks, it is scarcely surprising to learn that sheep have been found dead or sick with *Bacterium tularense* in their lymphatic glands. The discovery, however, is not one to be treated too lightly. The risk man incurs in skinning or dressing the flesh of infected rabbits is now well understood. May there develop a comparable risk to butchers and even to housewives who handle the flesh of sheep? And if sheep may be infected, why not cows and pigs? Is the day coming when all meat must be handled with gloves? The answers to these questions must depend largely on whether tularemia is considered as a new disease or as an old disease newly discovered. It is easy to find objections to either hypothesis. If the disease is old, it is remarkable that it has not been long ago described, for some cases are of a virulent type and the syndrome is not less characteristic than that of many other diseases. It is remarkable, too, that so virulent an infection with so numerous a host of vectors should not have left in former years a plain impression as an animal plague. On the other hand, if the disease is new, how has it arisen? Here are problems for the investigator!—*Jour. A. M. A.*, Vol. 92, No. 6.

Ano-Vulvitis and Posthitis in Cattle

By A. T. KINSLEY, Kansas City, Missouri

ANO-VULVITIS and posthitis has prevailed more or less extensively for at least the last thirty years. In cows and heifers the malady is usually localized in the region of the anus and vulva. A similar condition occurs in bulls and steers in which the lesions are usually confined to the prepuce. There may also be some lesions in both the male and female around the root of the tail. This disease is rarely fatal but is of considerable economic importance because of the loss of condition of the affected cattle. It is a herd infection, that is, the disease usually affects a large percentage of all of the cattle in a lot during an outbreak. One outbreak was investigated in Missouri in which the disease was first confined to one lot of approximately one hundred baby beef heifers. When the disease was first observed only three or four heifers were affected, but within a few days practically every animal showed evidence of the disease and within ten days over one thousand feeder cattle within a radius of three miles were affected.

Cause

The cause of this disease is the *B.necrophorus* which is prevalent in manure and soil and occurs in practically all feed yards and lots. This same germ causes foot rot in sheep and is also found in certain diseased conditions in swine. It is probable that this particular variety of germs occurs in the intestines of normal swine and therefore is prone to occur wherever hogs have been maintained.

Symptoms

All cattle regardless of breed and condition are susceptible to this disease. It is apparent that there is some predisposing influence to this infection for the germs are practically universally distributed and the disease is relatively rare. The disease is usually first observed in a relatively few cattle but within three or four days 50% or even 75% of the herd may be affected. In some instances the disease is confined to cattle in one feed lot and the same class of cattle in adjacent feed lots do not become affected, although the different lots of cattle may be separated only by a fence.

The principal manifestation of this disease is a swelling on the lower portion of the vulva on the margins of the anus or the surrounding skin. In steers and bulls the swelling usually occurs on the prepuce. The color of the swollen area is red in the beginning but soon become pale or has a yellowish or brown color. The skin of the affected area sloughs leaving a denuded surface and the surrounding tissue becomes cheese-like in consistency and has a very disagreeable odor. The diseased area extends and involves the surrounding tissue. Some cases have been observed in which all of the tissues of the anus, vulva or prepuce have been destroyed. A dense scab usually forms over the diseased area but the disease continues to extend involving tissues beyond the margins of the original wound.

During the progress of the disease there may be an elevation of temperature and loss of appetite and the affected animal may show marked depression and they shrink rapidly. In some cases the prepuce becomes closed due to the excessive swelling and the affected animal has difficulty in urinating. Extensive involvement of the prepuce or the region around the root of the tail may cause a straddling gait.

This disease is some times mild and affected animals recover without treatment, but in those outbreaks in which the disease destroys large areas of tissue prompt and proper treatment is required to prevent losses.

Treatment

Local application of some reliable antiseptic after the necrotic tissue has been removed usually results in recovery. In those cases in which there is extensive tissue destrustion two or more treatments may be necessary.

Ringworm in Cattle

By L. E. STARR, Blacksburg, Virginia.
Zoology and Animal Pathology Department, Virginia Polytechnic Institute

HERPES tonsorans, or what is commonly known as ringworm, is a contagious disease of the skin. It is caused by a microscopic thread fungus and is characterized by roundish, sharply-defined, grayish spots. The spots are raised slightly above the surrounding skin and are generally covered with scabs, and are hairless.

Ringworm occurs in all domestic animals, but most frequently in cattle, and more rarely in horses, dogs, cats, swine, sheep, and man.

Young animals are chiefly affected, but it may occur in mature individuals as well. It is especially prevalent in the former when they are confined in large numbers in stables or pastures. Calves up to two years of age are easily infected by rubbing scabs or pus from an affected animal on the uninjured skin of another. Older animals often cannot be infected either naturally or artificially unless the skin has been scarified or injured.

Lesions are most numerous about the face and neck, although they are not uncommon on the body.

Transmission usually results from the introduction of new animals that are affected, after which it spreads rapidly from animal to animal by rubbing against each other, licking, nursing, coition, and also from the use of contaminated curry combs, brushes, and blankets.

In the early stages no bad results are noted, but if not promptly controlled, it seriously affects nutrition, due to the irritation. It may also be transmitted to the attendants. In case of a large number of animals confined in a pasture or stable, it spreads rapidly, unless controlled promptly.

In May, 1929, a few calves in a dairy herd of about 150 head in this community were found by the herdsman to be affected with ringworm. He used tincture of iodin for a week or ten days with practically no benefit. When I first observed it, about 20 head were affected. In some of the older cases the lesions had spread and involved considerable portions of the skin about the eyes, face, and neck. In other cases large body lesions were present. Sulphur ointment made by adding sulphur to castor oil in sufficient amount to make it a stiff paste was prescribed. These calves were all stabled and individual treatment could easily be practiced. All loose scabs were removed and the ointment applied to the lesions with a paddle. On new lesions one or two treatments was sufficient to kill the fungus. On the older lesions, daily treatment was necessary for about a week before complete destruction of the fungus. Some trouble was experienced at first by the calves rubbing the ointment off, but this was corrected by tying or confining them separately.

Another outbreak occurred in a lot of approximately 175 head of dairy calves on a pasture. Fifty head had been purchased in the north and added to those already here. Presumably some of those purchased carried the infection, even though it was not observed at the time of arrival. These calves were on range and were not watched closely. When it was called to my attention, about 35 head were affected. The lesions varied from the size of a dime to half the size of a saucer. Sulphur ointment with a vaseline base was prescribed in this case. The owner had a dehorning chute and the calves were run through this daily and all lesions were painted with the ointment, using a wooden paddle as before. New lesions usually responded with one treatment, while older ones required more than one.

Bovine Mastitis*

By W. S. O'NEAL, St. Charles, Missouri

BOVINE mastitis needs no introduction to Missouri veterinarians. We have been on fighting terms practitioner in the state who would care to lay claim to an unbroken string of victories against this enemy. We have conquered here, put up a pitched battle there, and been ingloriously defeated when the enemy charged from an unexpected "quarter."

Several different classifications of mastitis have been established, and all are of value. However, Alexander, in "Udder Diseases of the Cow," has a direct, concise method of handling the subject that is to be commended. He is freely quoted in this paper. Doctor Alexander classifies udder diseases as congestion; mastitis; gangrene; tuberculosis; and actinomycosis. He further subidivides mastitis into catarrhal, parenchymatous, and contagious forms according to its manifestations.

Congestion of the Udder

Congestion of the udder, especially in heifers approaching the first parturition, is a natural condition. As one dairyman has said, "If one of my heifers does not show a good caked bag before calving I know that she is going to be a blank." Our principal problem with this condition is to so instruct our clients that they will recognize the first indications of a change from the physiological condition of congestion to the pathological manifestations of mastitis. Suggestions as to handling by the owner include a reduction in protein diet, increase in exercise, and, after calving, frequent milking, hot-water fomentations, with a lot of massage.

*Presented at the 38th annual meeting of the Missouri Veterinary Medical Association, Veterinary Building, State Fair Grounds, Sedalia, June 25-27, 1929.

Catarrhal Mastitis

Catarrhal mastitis consists of an inflammation of the mucous membranes of the teat and udder. This inflammation produces a slimy secretion, is not in itself particularly serious in so far as the life of the animal is concerned but often paves the way to more serious conditions.

The etiology of catarrhal mastitis may be listed as direct and predisposing causes. There is no doubt that the normal bacterial flora of the udder assumes a pathological significance under the favorable influence of predisposing causes. Among the more important predisposing factors may be listed chilling; wounds and bruises; rough, irregular, or incomplete milking; dietary and digestive abnormalities; and precocious secretion of milk.

Symptoms of this condition are manifested by slime in the milk; swelling, redness, heat and tenderness in one or more quarters. The milk decreases in quantity, and changes to a pale yellow or blood tinged slimy fluid containing clots or curds. Usually there is very little rise in temperature and no loss in appetite. The patient may show some stiffness in gait. The attack comes on suddenly and unless severe usually subsides in six to eight days.

Severe attacks may progress to the parenchymatous or interstitial forms; become chronic or end in abscess formation; atrophy; tumor formation; or gangrene.

Prevention is more important than treatment, and consists, in so far as possible in avoiding the predisposing factors.

Treatment, of course, varies somewhat with the needs of each particular case but a general line of procedure in all cases is important.

Isolate the affected cow, furnish an attendant who does not handle other cows, milk into a pail containing a disinfectant.

Administer with the stomach tube the following:

Epsom salts .....oz. 20
Ginger .....oz. 1
Gamboge .....oz. ½
Nux vomica, pwd.....dr. 1 to 2

Dissolve the foregoing in at least three gallons of hot water, add 1 to 2 ounces of formalin, and administer as hot as can be borne with the elbow. The purgative is carried ready mixed, and that amount used in the individual case as is indicated. One-half, two-thirds, all, or even more of the prescription is used according to the state of costiveness present.

Administer mastitis bacterin. Repeat at least three times if possible, about three days elapsing between each injection.

Inject a pint to one quart of flavine solution into the affected quarter. This solution is prepared by dissolving one gram of acriflavine in one gallon of distilled water; five grams of proflavine in another gallon of distilled water. Two ounces from each of these stock solutions is mixed with sterile water for injection into the udder.

Bathe the udder with water as hot as can be borne, massage gently but thoroughly, and milk out the contents of the quarter as thoroughly as possible. Alexander says, "The more completely the gland is kept emptied, the more rapidly will recovery be likely to take place."

The formalin is continued in daily one-ounce doses up to eight ounces; well diluted, preferably with milk.

Ointments may be used. They should have a lanolin base, penetrating antiseptic agents, and preferably a good odor.

Parenchymatous Mastitis

Invasion of the udder by pathogenic bacteria constitute the cause of most cases of parenchymatous mastitis. Among those bacteria most commonly incriminated are the streptococci, staphylococci, B. pyogenes, and the Brucella *abortus*.

The symptoms include a rise in temperature to 103° to 108° F. The pulse is at first bounding and full, soon becomes small, feeble and fast. Rapid breathing, dry muzzle, drooping ears, impaired appetite, atony of the rumen and other digestive disturbances foretell the seriousness of the condition. The udder is intensely swollen, red, hot and very painful. The cow is usually stiff, often to the degree of marked lameness. Milk from the affected quarter is thin, yellowish brown and mixed with blood and curdled casein.

Alexander says, "There is no absolutely certain or specific method of treatment. The disease when thoroughly established is incurable. The veterinarian treats symptoms as they appear." Certainly there is no fault to be found with his statement. The prognosis should be guarded. The general line of treatment as for catarrhal mastitis is indicated, with such additional care and medication as is demanded by the individual case.

Gangrene of the Udder

Necrosis of tissue together with putrefactive changes constitute gangrene of the udder.

The gangrenous part becomes cold, insensitive, purple in color, and a line of demarkation forms between the diseased and healthy tissue.

Affected cattle of ordinary value are generally marketed for their salvage value. Amputation of the udder when the entire structure is affected, is indicated. Alexander recommends sweet spirits of niter and aromatic spirits of ammonia, one ounce of each in one pint of strong coffee every three to six hours as indicated to maintain a defense against prostration. Twice daily, he advises 30 grains of quinin sulphate in two drams of perchlorid of iron administered in a thin gruel.

Surgical intervention is probably best delayed until the line of demarkation between healthy and diseased tissue is well established. Mercurial ointment applied to the diseased area is indicated until excision of the necrotic mass is performed.

EDICINE

ecomes
athing,
red ap-
other
e seri-
dder is
y pain-
to the
k from
llowish
curdled

solute-
tment.
olished
treats
rtainly
th his
ld be
tment
icated,
ication
case.

putre-
ene of

ld, in-
ine of
seased

ue are
alvage
when
indi-
sweet
its of
e pint
hours
efense
ne ad-
n two
stered

best
on be-
s well
pplied
il ex-
rmed.